$3.00 a Year 50c a Copy

VETERINARY MEDICINE

AUGUST 1936

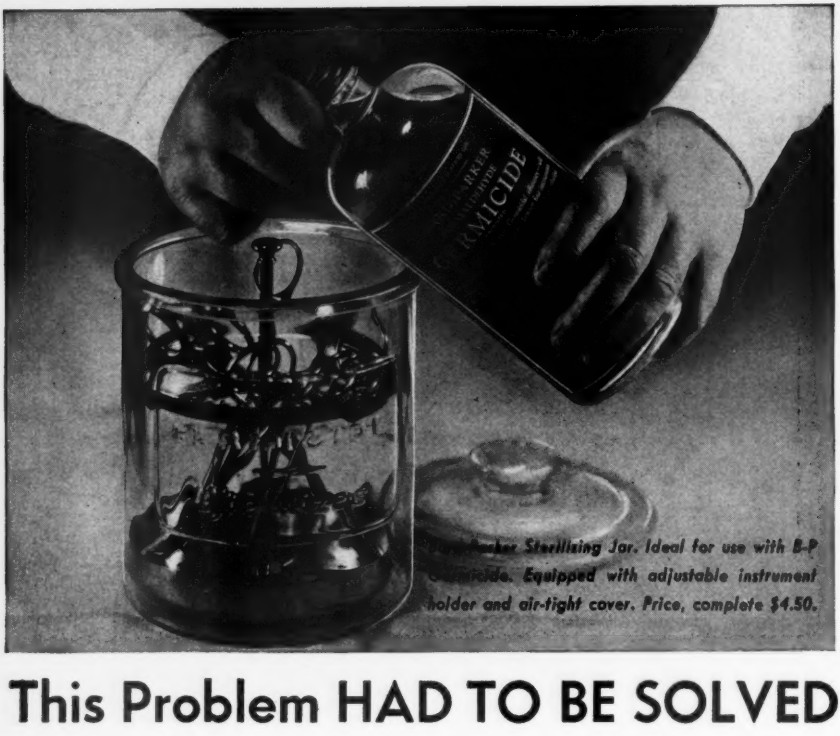
CONTENTS

Microbic Virulence and Host Resistance 320
The Smallpox Menace 321
Cost of Inadequate Veterinary Service 321
Are College Trained Veterinarians Necessary? 322
Necessity for Animal Experimentation 323
Veterinary Medicine in Ohio 324
Serum-Marketing Agreement 327
New Associations 327
Domestication of Animals 328
The Plagues of Antiquity 329
Salmonellosis in Web-Footed Birds 330
Principles of Canine Nutrition 331
Veterinarians' Interest in Poultry Diseases 333
Air Conditioning for Veterinary Offices and Hospitals 334
Tetanus in a Heifer 336
Screw Worm Control Extended 336
Pyometra in a Scottish Terrier 337
Laminitis in Horses 338
"Cornstalk Disease" in Horses 340
Hadley's Questions 346
Blood Transfusion and Fluid Infusion 347
Multiparous Mares 356
Abstracts from Current Veterinary Literature 357-62
Book Review—Fur Farming 362

VOL. XXXI
No. 8

Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of March 3, 1879.

75 E. Wacker Drive
Chicago, U. S. A.



Bard-Parker Sterilizing Jar. Ideal for use with B-P Germicide. Equipped with adjustable instrument holder and air-tight cover. Price, complete $4.50.

This Problem HAD TO BE SOLVED

Uniformly superior Bard-Parker surgical knives and scissors were available to the profession. Our problem then became one of preserving these superior qualities after the instruments had passed through a sterilizing process that not only insured maximum sterilization, but avoided the possibilities of rust, corrosion or injury experienced when boiling, steam or chemical mediums were employed.

BARD-PARKER
Formaldehyde
GERMICIDE

has proved the practical solution to this important problem. It affords economical sterilization which is absolutely rust-proof and safe for all steel instruments, syringes and heat treated rubber. It dries rapidly without residue, making the recontaminating steps of rinsing or wiping unnecessary. It is stable and retains its germicidal potency after repeated immersion of instruments. Replacement and repair of instruments caused by rust and corrosion are eliminated. These important characteristics make B-P Germicide a decidedly economical sterilizing agent.

Prices: Pint bottles, $1.00 each. Quart bottles, $1.75 each. Gallon bottles, $5.00 each. For quantity discounts ask your dealer.

PARKER, WHITE & HEYL, INC.
DANBURY **CONNECTICUT**

A BARD-PARKER PRODUCT

Veterinary Medicine

Registered in U. S. Patent Office

Vol. 31 AUGUST, 1936 No. 8

Published Monthly by the Veterinary Magazine Corporation
75 East Wacker Drive, Chicago, Ill., U. S. A.
$4.00 a Year; per Copy 50 Cents.

Copyrighted 1936, by Veterinary Magazine Corporation.

All matter appearing in this publication is covered by copyright, and no part of it may be reproduced without specific permission.

Permission will be granted on request for reproduction of anything in the columns of VETERINARY MEDICINE if the purpose of the reproduction is unobjectionable. Where there is any question as to the propriety of reproduction, the wishes of the author will be consulted.

D. M. Campbell, Editor A. T. Kinsley, Associate Editor
H. J. Mostyn, 1265 Broadway, New York, Eastern Representative

About half the farm land of the United States is partly or wholly used in supplying the country's meat, and the cash income of the farmer from meat animals is larger than his cash return from his cotton, wheat, oats, rye and corn crops combined.

According to the 1935 census of agriculture, almost five and one-half million farms, out of the national total of nearly seven million, reported having some cattle —with approximately one and one-half million of them producing beef cattle. Hogs were grown on nearly four million farms, and sheep on almost two-thirds of a million.

As measured by the plant value of its product, meat packing is the largest industry in the United States. The value of its output is usually larger than the value of the petroleum produced, or of the steel manufactured, or of all the automobiles leaving the assembly line.

Last year meat animals supplied more than 25% of the estimated cash income of the American farmer from the sale of his products; dairy products were second, with about 19½%. Fruits and vegetables ranked third, with about 14%. Cotton was 4th, grains were 5th and poultry and eggs, 6th.

The custom of smoking meat unquestionably grew out of the drying practice. When the meat was hung in the top of the tepee or hut where the heat of the fire could increase its rate of drying, it was also exposed to the smoke of the fire which caused another flavor to develop.

Some authorities have thought that the handling of meat on salty ground may have originally led to the discovery of the preserving effects of salt. The companion of salt in meat curing, saltpeter, was perhaps discovered through its being an impurity in the salt that was used. The discovery that saltpeter preserved the reddish color of meat led to its combination with salt centuries ago.

Hog prices advanced sharply in 1935 because production was far below normal. The average price for hogs at Chicago, for the year, was $11.63, including the processing tax. This was 111 percent of the 1925-29 average of $10.43. Yet the total amount paid to producers by packers for hogs in 1935, plus benefit payments, was only 70 percent of the 1925-29 annual average. Cattle marketings, on the other hand, were not curtailed last year and packers paid the cattle producers 76 percent of the 1925-29 annual average with no benefit payments included.

Prof. Prawochenski of the Zootechnical Institute of Borowina, Poland, recently had a lamb born to a ewe that he had impregnated with seminal fluid received from the Cambridge (England) University, School of Agriculture, 1500 miles distant. The seminal fluid was packed in ice immediately upon its collection and was used the third day following. The experiment demonstrates the widening possibilities for the future of using valuable sires to improve the quality of farm live stock. At the research station at Cambridge, a calf was recently born from fluid kept under controlled conditions for three days, and a lamb from fluid four days old. New York can now be reached from Central Europe, by air transport, in but little more than half this period.

* * * *

The discovery by Webster and his colleagues that microbic virulence is apparently a relatively stable property when examined under natural and controlled conditions, has come as a surprise to some pragmatic immunologists who have sponsored the idea that the coming and going of epidemic disease is essentially due to corresponding changes in virulence of the incitant.[1] It is too early to say whether the outcome of these experiments would justify the general deduction that fluctuations in virulence are of no significance in the epidemicity of all diseases.

* * * *

The success or failure of an infectious agent in reaching a second host from the previous one, depends in large part on the directness of transit available.[1] Contact between the diseased individual and a prospective recipient affords the most direct means of transfer of an infectious agent. Contact may be direct, as when the recipient, with an abraded finger, touches the contaminated body or lesion of a patient, or as when a germ-laden nasal secretion is projected by sneezing in the face of a susceptible individual. Contact, on the other hand, may be indirect and in varying degree.

When bacteria and other disease agents are discharged into the outer world without the advantages of contact or direct transmission, their fate is problematical. It is only their enormous number and their wide distribution, coupled with insanitary conditions, that renders this route of infection still responsible for the majority of instances of infectious disease.[1]

* * * *

There is no such thing as a spontaneous infection,[1] any more than there is spontaneous generation of life. Each instance of infectious disease is theoretically, and usually in practice, traceable to a previous instance of the same disease from which the infectious agent has come more or less directly. This fact does not preclude the possibility of a saprophyte gradually acquiring pathogenic properties, nor yet of the gradual differentiation of a new variety of infectious process, but it seems likely that most of the infections with which we are familiar have always existed, and are singularly constant in their manifestations.

* * * *

The perpetuation of a pathogenic agent depends not only on its survival in transit between hosts, but on its reaching the second victim in sufficient numbers and in a state of relatively unimpaired vigor or virulence; nor does the mere arrival of the disease agent on the surface of the host suffice to inaugurate a new instance of infection.[1] And by surface is meant not only the visible areas of skin, but the invaginated surfaces of the gastro-intestinal and respiratory tracts. The diphtheria bacillus may reside on the skin, the pneumococcus in the mouth and the tetanus bacillus in the intestine for long periods of time without inaugurating their respective disease processes. This "carrier" condition may be due not simply to natural or acquired resistance in the individual under consideration, or to any inherent lack of virulence in the strain of parasite, but to the fact that each pathogen is more or less dependent on a particular method of approach. It must arrive, in other words, at a specific portal of entry.

[1] Gay, F. P. "Agents of Disease and Host Resistance."

Much of our present-day knowledge of medical science is due to experiments upon dogs.—*Simon Flexner.*

* * * *

The Forest Service of the U. S. Department of Agriculture is responsible for the administration of more than 80,000,000 acres of range lands on the National Forests. These ranges furnish summer grazing under permit for some 13,000,000 livestock of all ages and are an important factor in the country's production of meat animals, hides, wool and mohair. Range management on the National Forests looks to the equitable distribution of grazing privileges and effective utilization of the ranges, at the same time maintaining the range forage as a permanent and continuing resource.

* * * *

THE SMALLPOX MENACE

Smallpox is an easily preventable disease. It has been eliminated or brought under complete control in most of the civilized nations of the world. It is increasing in the United States, where 8,000 cases occurred in 1935. It is, however, by no means evenly distributed throughout the United States. Eight western and northwestern states—Washington, Idaho, Montana, Wyoming, Colorado, South Dakota, Nebraska and Kansas—with a population of only 8,000,000, had 5,000 cases—62½% of the total number. Seven eastern states—Maine, Massachusetts, New Hampshire, Connecticut, Rhode Island, New Jersey and Pennsylvania—with a population of 21,500,000, had no cases of smallpox in 1935. Probably the sparse population of the northwestern states alone saves them from a devastating epidemic of small pox. A recent study of the susceptibility to small pox among 5000 college students revealed that 75 of every 1,000 students are without adequate protection against the disease. Applied to all college students in the United States, this means that 83,250 need to be vaccinated or revaccinated. Of the 75 per 1000 in need of vaccination, 33 have never been vaccinated and 42 have been improperly vaccinated or vaccinated so long ago as to have lost much of their immunity.

Without animal experimentation, we would walk in fear of plague, of typhus, of typhoid, of malaria and yellow fever. Diphtheria would still take its toll of child lives. Surgery would be primitive and anesthesia risky. Much of our knowledge of physiology and of life processes, upon which the progress of medicine of the future depends, would be lost to us unless, indeed, men instead of guinea pigs were used in the laboratories.—*Chicago Tribune.*

* * * *

A COST OF INADEQUATE VETERINARY SERVICE

In the matter of animal disease, the American colonists were very fortunate. In Europe, from the beginning of the Dark Ages to the establishment of a professional veterinary service, great animal plagues swept across the land periodically, the precursors of famine and pestilence, frequently of war and sometimes of the fall of governments. In the American colonies the animals were scattered; there were no traffic lanes over which they might be moved over long distances in any considerable number. As a result, for many years the colonists were not harassed by sweeping epizootics, easily capable, had they occurred, of producing famine. The wars with the Indians were local affairs. The War of 1812 brought no general mobilization of land forces; the Mexican War was so far away, and the means of travel so poor that it spread no epizootic except glanders and little of that. It was not until the Civil War that the people of the United States had to bear the full penalty of an inadequate veterinary service, with the loss of an unbelievable number of animals in the military establishment and the spread of an incalculable amount of glanders from military animals to the horses of the civilian population. It required 40 years to bring under control glanders spread by the Civil War. An improved veterinary service prevented the spread of any glanders from animals of the army to the animals of the civilian population during the last two wars in which this country has been involved.

Are College-Trained Veterinarians Needed?

IF YOU answer in the affirmative, upon what do you base your claim? Suppose the system of animal disease control based upon teaching veterinary medicine to the owners of animals is declared sufficient, what argument have you to contradict it? The American people, including the veterinarians themselves, have been lead to believe that diseases of domestic animals have been well managed, even to the point of boasting that "ours is the safest place on earth to raise livestock." If this were true, what is the basis of the declaration?

EVERYONE at all curious is aware that the animal-disease situation of our country is not known. There is no orderly procedure in force to collect all of the facts and lay them upon the table as the actual veterinary problem of the United States. Until this is accomplished one can be none too sure that the veterinary profession can claim even the right to exist. The profession can blunder along helping out what appears to be an irrational system of medicine, silent and practically unknown, or it can go on trying to take charge of the situation entirely as it is now doing without notable success. But, in neither plan can sufficient progress be made until the extent of the task, brought out for analysis, indicates whether or not an orthodox system of veterinary education is a thing worth while. In short, to prove they are needed, is a main task of the graduate veterinarians. 'Til now much ado has been made about sporadic bursts of publicity, public relations, advertising the profession, etc. But, all of this is dubious travail until the answer to this headline becomes common knowledge, and it cannot become common knowledge until the veterinary profession is prepared to place the scope of its task squarely and correctly before the people. The whole veterinary problem must first be opened up for intelligent survey as the initial project. A united, well disciplined profession will be required to accomplish that purpose. A nation is loath to admit the failings of any of its industries and none of its industries in turn is prone to point out its own flaws and faults. Much of the trouble of the veterinary service in all countries has been due to hiding the truth. It is more human to boast that one has the biggest this and the biggest that or the best this and the best that in the world and go on blundering downward rather than to accept the truth and proceed in the upward direction.

NATIONS go up or down with their veterinary services. To this there is no contradiction funny as it would seem just now to an American statesman. China with its no-veterinary service policy remained just China for centuries. Now it is yielding to Japan which has seven times as many veterinarians as the United States or France in proportion to the number of its domestic animals. Russia is developing a classical veterinary service and is increasing its power by leaps and bounds.

As Leclainche points out, the ancient civilizations thrived until the Greek philosophers and their Christian successors decreed that animals have no soul and were therefore not entitled to the blessings of medicine. Under that doctrine the world went into centuries of darkness, while the Arabs by rehabilitating veterinary medicine to the highest pitch maintained a toe-hold in Europe and prospered for seven centuries, when an antiscientific régime overtook them, and there they are. Meanwhile, an age of reason came upon Europe and medicine advanced, veterinary education was established, the French Revolution came and passed, and here we are. What part will veterinary medicine play in our destiny? Our people are yet to realize how much they owe to animal production or how much their future depends upon its discipline. The veterinary profession must attempt to teach that and upon the success achieved will rest its future operations.

The time appears to have come when the perturbing questions of education, quackery, and commercialism should be set aside for a comprehensive analysis of the profession's problem—the incidence of disease among animals.

If the group known as qualified veterinarians of this country of ours cannot be spurred to join their professional organizations and participate in their work, and keep abreast with the professional and technical problems of their occupation by diligent reading; and if one group feels called upon to quarrel with another for personal advantage instead of agreeing candidly upon a general plan of action, much of the hope for a brilliant future vanishes.—*L.A.M.*

* * * *

NECESSITY FOR ANIMAL EXPERIMENTATION

Informed laymen are well aware that animals are built on the same plan as man; they have the same organs working by the same nervous and chemical machinery. They subsist essentially on the same kind of food and the same kind of air as man, and are subjected to essentially the same kind of disorders as man. The causes and effects of disorders of the heart, the stomach, the lungs, the eyes, the nerves, or the brain are essentially the same in animals and man. When the experimental method was introduced in science, including the science of medicine, experiments on animals resulted in rapid progress of our understanding of the nervous and chemical machinery operating in the body in health and disturbances of this machinery that lead to disease. Thus, animal experimentation has played a very great rôle in the development of our knowledge of infections and their control, of anesthesias and their refinement, of disturbances in nutrition and dietary deficiencies, in growth, in the development of new and valuable drugs and their continued refinement.

There were more than 30 years of intensive research on animals—mainly on the dog—before we had the substance *insulin* in sufficient purity to warrant its trial on people sick with diabetes; and even now every new lot of insulin must be tested on animals before it is safe for the sick man, the sick woman, or the sick child. I sincerely believe that if every man and woman in this country knew the inspiring story of the discovery of insulin, all voices would be raised in approbation of such fruitful biological experimentation.

It was not till the great William Harvey began to observe and experiment on animals that we started to understand the heart, the blood, the circulation. We began to make real progress in the understanding, if not in the control of cancer, when this malady was discovered in animals and experimentally produced in animals.

We cannot say today what animal will yield the hoped for answer to cancer prevention or cure. Animal experimentation has been a great factor also in giving us better knowledge of anemia, digestive and kidney disorder, glandular disturbances, nervous diseases, the control of hookworm, scurvy, etc. You need not take my word for it. Read history and form your own judgment. The facts are obvious.

I wish that all of you might read the history of biology and medicine of the last 300 years, and really be informed as to the facts and value of animal experimentation as it is carried on at Harvard, at Yale, at Johns Hopkins, at Chicago, at the Rockefeller Institute, and the Mayo Clinic, or in fact, at any first class University, medical school or hospital here or abroad. Would the commonwealth care to live under the health conditions and be treated for sickness by the empirical and often harmful methods that were obtained before animal experimentation laid down the laws for personal and public health and hygiene, which minimized the incidence of epidemics or made the physician a real diagnostician surgeon, and healer? Would the commonwealth care to be deprived for one day of the fruits of animal experimentations in the realm of health and disease of man as well as animals?—*A. J. Carlson,* University of Chicago.

VETERINARY MEDICINE IN OHIO

The 74th annual meeting of the American Veterinary Medical Association, which is to be held in Columbus, August 11-14, 1936, will be the fourth meeting of that association to be held in Ohio. The first meeting of the national association, then called the United States Veterinary Medical Association, held west of the Appalachian Mountains or elsewhere than in Boston, New York and Philadelphia, was held in Cincinnati, then the metropolis of Ohio, September 16, 1884.

First Ohio Meeting

The meeting convened at 1:00 P.M. (the forenoon being taken up by a meeting of the comitia minora) and heard two committee reports, one on diseases by A. Liautard, and one on intelligence and education by W. Horace Hoskins. In the afternoon, these reports were discussed at some length, resolutions adopted concerning each of them. A paper by D. V. Dixon, advocating the separation of the association into an eastern and a western section, was read and discussed, as was also a paper by T. S. Very. The association then adjourned without hearing papers that had been prepared for it by A. Liautard and J. C. Meyer, Sr., because of lack of time.

In Prof. Liautard's report on diseases, he advocated that all veterinarians be compelled to report all cases of contagious diseases coming to their attention. A resolution was adopted urging them to report such diseases to the proper authorities. Doctor Hoskins advocated uniform requirements by the veterinary colleges for graduation and a committee was appointed to study the problem further.

At that time there was another general veterinary association in this country. It was known as the National Veterinary Medical Association and L. V. Plageman, M.R.C.V.S., of New York was president. It was in the first year of its existence.

The U. S. V. M. A. was at that time 21 years old. At the meeting at the Astor House, New York, on June 9, 1863, at which the association was organized, there were 38 in attendance. At the Cincinnati meeting, 21 years later, the membership was somewhat less than twice that number and the attendance was only 15. The attendance at the preceding semi-annual meeting, held in Boston in March, 1884, was 40, the largest in the history of the association up until that time.

Although the failure of the western veterinarians to attend the Cincinnati meeting was a disappointment, the meeting was otherwise regarded as highly successful and in six years, the association held another "western" meeting at Chicago, followed three years later (1893) by a second meeting in Chicago. Since then, of course, there have been many "western" meetings, several of them actually western—San Francisco, 1910; Oakland, 1915; Portland, 1925; Los Angeles, 1930.

At the Cincinnati meeting in 1884, W. B. E. Miller was president and C. B. Michener, secretary. This meeting was mentioned briefly by the *American Veterinary Review,* but was not referred to at all by the *Journal of Comparative Medicine and Surgery,* then in its fifth year of publication.

State Association

The Ohio Veterinary Medical Association had been organized the preceding year, and like most of the earlier state associations, was holding semi-annual meetings. Its meetings were two-day affairs and the programs far more elaborate than those of the national association. The attendance too at the state meeting was greater than at the national. Those prominent in the association at the time were: W. C. Fair, J. V. Newton, J. S. and G. W. Butler, J. C. Meyer, Jr., and others. At the third meeting of the Ohio association held in 1884, D. E. Salmon of Washington, D. C., was the principal speaker, his subject being "Contagious Pleuropneumonia in Cattle."

Second Ohio Meeting

No other meeting of the national association was held in Ohio for another 21 years (August 15-18, 1905). By this time the association was 42 years old. Its meetings had been extended from one day to four days, including a clinic, and holding semi-annual meetings had been discontinued. The attendance at Cleveland, where

the meeting was held, was 130 members, 111 veterinarians not members, 70 ladies, and 22 others not veterinarians. M. E. Knowles of Montana was president at this meeting and John J. Repp of Pennsylvania was secretary. The name had been changed (1898) to American Veterinary Medical Association and the membership had grown to 579. Thus, although the membership had increased less than 100% in the first 21 years of its existence, it had increased nearly 900% in the second 21 years.

On the program we find the names of many still active in veterinary work: W. L. Williams, L. A. Merillat, E. L. Quitman, L. A. Klein, Chas. H. Higgins, John H. McNeil, L. M. Hurt, Jacob Traum, John R. Mohler and others; but a much larger number who are no longer with us: S. Stewart, V. A. Moore, M. H. Reynolds, Leonard Pearson, John W. Adams, W. Horace Hoskins, R. C. Moore, Roscoe R. Bell, Geo. W. Dunphy, James Law, Geo. H. Berns, J. V. Newton, H. J. Detmers, P. A. Fish, R. H. Harrison, D. Arthur Hughes, S. H. Gilliland, M. H. McKillip, S. H. Ward, J. H. Blattenburg, A. H. Baker, J. G. Rutherford and others.

D. W. Ashcroft, Chairman, Banquet Committee, Columbus, Ohio

The program contained but one paper on small animal practice, "Clinical Examination of the Blood of the Dog," by S. H. Burnett and Jacob Traum. The clinic included but one canine case.

There were four correspondence veterinary schools in operation at the time—The Veterinary Science Association of London, Ontario; The Collins Veterinary College (also resident) of Nashville, Tenn.; The Veterinary Correspondence School of Sioux City, Iowa, and the Detroit Veterinary Dental College, Detroit. Only the first named succeeded in finding a market for the sale of its diplomas.

Oscar V. Brumley, Dean, College of Veterinary Medicine, Ohio State University, Columbus Chairman Committee on Entertainment

Third Ohio Meeting

The A. V. M. A. returned to Ohio 15 years later, holding its 57th annual meeting in Columbus, August 23-27, 1920. At this meeting, C. A. Cary of Alabama was president and N. S. Mayo of Chicago, secretary. The membership had reached its high point in number, 4,100. The meeting was largely attended, but among those in attendance were only two who had attended both of the preceding meetings in the state—W. Horace Hoskins and W. C. Fair. The meeting was held so recently as to be a matter of common memory.

Veterinary Education in Ohio

Ohio has occupied and still occupies an important place in veterinary education. The first course of veterinary lectures given in an agricultural college were those of Robt. Jennings in the Ohio Agricultural College (Cleveland), 1854-57. Veterinary literature contains no reference to the number of students who took this course, nor to their subsequent occupation; but appar-

ently the purpose of the course was to train men for veterinary practice and it seems a reasonable assumption that some of the early veterinary practitioners of the state were from this source. The school suspended operation in 1857 and there was no further veterinary instruction given in the state until a course of veterinary lectures was established in the Ohio Agricultural and Mechanical College in 1873.

Jas. D. Grossman, Chairman, Alumni Committee, Columbus, Ohio

Professional veterinary education in the state began with the inauguration of the College of Veterinary Medicine of the Ohio State University in 1885, the year following the first meeting of the national veterinary association in the state at Cincinnati, August 15, 1884. It has graduated nearly 1200 students. The deans have been: H. J. Detmers, 1885-96; David S. White, 1896-1929; and Oscar V. Brumley, from 1929 to date. In addition to its undergraduate instruction the college has held nine practitioners' short courses which have been well attended by veterinarians of Ohio and surrounding states.

In 1891 the Ohio Veterinary College was established at Cincinnati. This school was operated for five years and graduated 67 veterinarians. It was not recognized by the national association. It was followed by the Cincinnati Veterinary College, established in 1900 and operated till 1920, graduating altogether 410 veterinarians.

In addition to that afforded in the College of Veterinary Medicine, which was included among the five "Class A" veterinary colleges in North America by the Committee of the A. V. M. A. (New York, 1934, Oklahoma City, 1935), limited veterinary instruction is afforded by the Poultry Department of the Ohio State University in a correspondence course, "Poultry Science, including Poultry Diseases."

Statistics on Domestic Animals in Ohio

	1935	Value	Rank
Cattle	1,951,234	$47,309,179.00	11
Chicken	19,619,263		
Goats	7,667	26,835.00	
Hogs	2,050,299	12,096,764.00	5
Horses	478,456	52,906,680.00	10
Mules	33,991	3,701,726.00	22
Sheep	2,395,882	10,062,704.00	7
	1930	Value	Rank
Cattle	1,495,193	$97,637,802.00	13
Chicken	18,000,000	74,500,000.00	6
Goats	4,544	22,910.00	
Hogs	2,777,938	28,793,623.00	7
Horses	491,730	50,404,015.00	12
Mules	31,181	3,285,338.00	22
Sheep	2,535,664	15,847,147.00	8

Darke County leads in horse raising with 10,772 horses in 1935 (11,421 in 1930).

Knox County leads in sheep raising with 121,219 sheep and lambs in 1935 (123,121 in 1930).

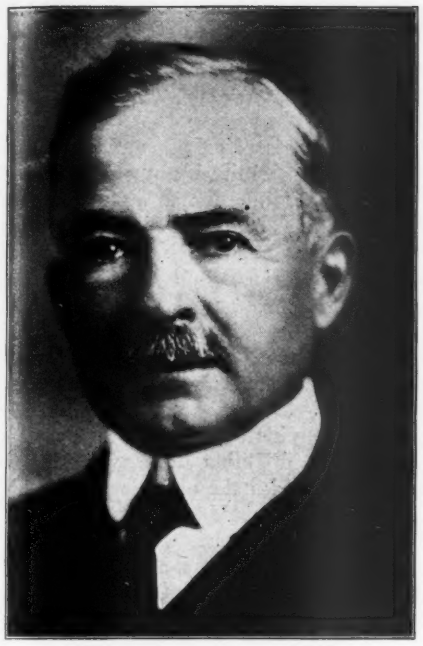
Licking County leads in cattle raising with 42,695 cattle in 1935 (30,969 in 1930).

Clinton County leads in hog raising with 67,407 hogs and pigs in 1935 (93,166 in 1930).

More cattle and fewer hogs and sheep on farms were reported in Ohio on January 1, 1935 than on April 1, 1930. Cattle of all breeds increased 30.5%. Hogs, following several years of disastrous low prices, declined in number 26.2%; nevertheless, that state advanced from the seventh rank to the fifth. Sheep and lambs also declined approximately 5.5%.

VITAL STATISTICS

The Third Pan American Conference of National Directors of Health recognizes that the securing of complete reports regarding the communicable diseases is a basic requirement for successful public health work, that the problem varies in different localities and in the several countries, and that while it is one that may never be entirely solved, it merits constant thought and consideration by public health officers throughout the world, in order that continual improvement in reporting may be achieved.—*Resolution of Pan-American Health Conference.*



MARK FRANCIS, 1864-1936

Dr. Mark Francis, dean of the School of Veterinary Medicine of the Texas A. & M. College, died at his home in College Station, Texas, June 28, 1936, at the age of 72. Doctor Francis was graduated from the veterinary department of the Ohio State University in 1887. He went to Texas soon after his graduation, where, for nearly 50 years, he had devoted himself to the upbuilding of the cattle industry and the promotion of veterinary science. He was one of the pioneer investigators of Texas fever. Since the establishment of the School of Veterinary Medicine in 1916, Doctor Francis has been its dean. He is survived by his widow, a son and a grandson, two brothers and three sisters.

SERUM-MARKETING AGREEMENT

To insure the maintenance of an adequate supply of anti-hog cholera serum and hog-cholera virus and otherwise to improve trade conditions, the U. S. Department of Agriculture, in cooperation with the serum industry, has developed a serum-marketing agreement. (For details see VETERINARY MEDICINE, 31:3, March, 1936, P. 100.) The plan is authorized by a recent Act of Congress which established as a national policy this form of aid in combating hog cholera. The act specifically empowers the Secretary of Agriculture to consult with manufacturers of anti-hog-cholera serum and hog-cholera virus with respect to the commercial handling and distribution of such products that move in interstate or foreign commerce.

Administration of the agreement is to be partly through a control agency representing the industry that will deal especially with commercial problems. The Bureau of Animal Industry of the Department of Agriculture, through Dr. D. I. Skidmore, Chief of its Division of Virus-Serum Control, is prepared to administer the agreement, to continue the scientific and veterinary work authorized by the virus-serum law, and to represent the interests of livestock producers and the public generally. The Secretary of Agriculture has supervisory powers with authority to terminate the agreement should need arise for such action.

NEW ASSOCIATIONS

Because of certain dissatisfactions, which may be in part justified, there seems to be a tendency among certain groups of veterinarians to abandon already established organizations and initiate ones of their own. This is deplorable. I do not believe that any group of veterinarians representing only one or two of the various phases of the profession can divorce themselves from the rest of us and go it independently. Practice, research, teaching, regulatory work and the military must be ever interwoven and overlapping. Among them there can be no marked line of cleavage drawn. They are interdependent. One can no more think of removing as a body from the American Veterinary Medical Association or from any state organization a group of veterinarians representing a phase of professional work and expect the mechanism to function any more than one could hope to see a motor car operate from which the transmission had been removed. We must remember the danger of a Mexican political policy, a scheme of self determination run riot, a crippling affliction which hurts all of us and in the long run does none of us any good.—*D. S. White, presidential address, 58th Annual Meeting, A.V.M.A.*

When and How Were Animals Domesticated?

By L. A. Merillat,
Chicago, Illinois

SEARCHING scientists agree that the domestication of animals stands out as the greatest achievement of mankind. All art, science and invention are subordinate to this almost forgotten accomplishment.

Although the most erudite prehistorians may disagree more on how than when was accomplished the subjugation of animals, it is generally conceded that man and domestic animals grew up together leading a precarious existence during geologic ages lasting not thousands but hundreds of thousands of years, migrating hither and yon to escape the vicissitudes of changing climate and terrain. It is not relevant to say that primitive man, at some particular time and place, captured, tamed and put to work the wild life filing before his eyes. The hypothesis does not conform to the known facts of human history. In his exploitations of the world in which he lived, the being classified in the animal kingdom as *Genus homo* could not have foreseen the use of animals for power and transport, in the absence of any precedent custom. Moreover, except perhaps for the turkey which was domesticated (or redomesticated) during the Spanish conquest of the Western Hemisphere, no additional species of animal has been domesticated for thousands upon thousands of years. The brief seventy or more centuries comprised in the known history of man is a stretch of time too short to have brought new species under man's control. So, the exact time when primitive man first saw more than edible flesh and crude raiment in his animal contemporaries is a matter of eons not of mere centuries or millennia ago.

THE question of when animals were first domesticated[1] is, however, less controversial than how it came about. The theory that the caveman suddenly conceived the great idea of catching, taming and training wild life is not supportable. It is presumptuous. Man was none too well domesticated himself. Although perhaps more cunning and more intelligent than the beasts of the plains and forests in certain respects, he could not have forecast the era of animal production and utilization in which his descendants were to live through the coming ages. He did not have the superiority complex, animal domestication was to bring his descendants thousands of years later. Fighting little more than an equal battle with the animals around him, primitive man could not have been sure that they, and not he, were the immortal superiors. It was only after many thousand years (about 400 B.C.) that Plato expounded the doctrine of the soul and denounced animals as not entitled to that precious gift.

The popular opinion today among zoological anthropologists is that animals came to man, not *vice versa*. The dog may be cited as an example. From the lurking poacher of the human domicile to watchman, hunter, companion and puppy playmate of the children was obviously a shorter step in animal domestication than luring wild mares, ewes, goats and cows to furnish a milk supply. Except for the flesh, fur and hides obtained by the dangerous task of killing animals with ineffective weapons, the dog and the milkers were the first sources of human provisions furnished by animals. How come? While the one-time luxuriant soil of Central Asia—cradle of civilization—was slowly changing to its present state of aridity, wild life, as the theory goes, concentrated more and more in the narrowing oases where their only chance of survival rested in the helping hand of man who, under the circumstances, had less chasing and capturing to do than prehistorians previously supposed. Modern research, which is fast unfolding human history far beyond former concepts, has

[1] Primitive man unquestionably started domestication of animals by barricading them in sheltered valleys from which they could escape only with difficulty, and which possessed sufficient grazing for their support. Horses, cattle, sheep and swine were probably handled in this manner. —E. N. WENTWORTH.

upset the immature conclusion that man in his superior wisdom went out and simply captured animals to put to work for him.

In short, the domestication of animals was an inescapable event of human development. It belongs to the geologic-geographic-biologic transformations from which nothing on earth could escape. The battle of life in a region of lessening flora, brought the fauna into closer relationship, and that in a word explains the interdependence of man and his domestic animal possessions from the remotest antiquity to 1936 of the present era; and (if that should come to pass) until both revert to the "place whence they came," through the succeeding centuries.

WHERE either man or animals came from, few are egoistic enough to say. But certainly, if man developed from the progenitors of the screeching monkeys of the tropics, he did pretty well; and if animals which have no soul according to the Platonic doctrine, had a corresponding root, they are lucky to have yielded to a human sponsor.

The importance of these unassailable facts is the way domestic animals in nature are welded to the franchises, possessions and work of mankind as inseparably as the elements of a stable chemical compound. They are not an element superimposed on civilization but a part of its structure since its earliest embryonic stage. Whether mankind has always realized this fact, is a question every veterinarian should be able to answer intelligently.

Since the remotest antiquity domestic animal conservation is sharply defined into three periods:

1. From the earliest times to the days of the Greek philosophers when domestic animals were nurtured with care, worshiped as gods, and comprised the bulk of national wealth.

2. The centuries of Greek, Greek-Roman, and Roman domination, characterized by unspeakable neglect of domestic animals, which took the civilized world through centuries of suffering, decline, and forbidding poverty.

3. The modern period from the founding of veterinary education to the present moment, when nation after nation began to turn their minds to the wisdom of the ancient people, established veterinary schools, veterinary services, research laboratories, and succeeded in building up nations of wealth, strength and refinement with unbroken progress. And, here we are!

ECONOMISTS may get perplexed, baffled and confused in hunting through cause and effect but that civilization has oscillated in mathematical precision with the conservation of domestic animals stands unsullied before any argument to the contrary. The history of mankind lends itself to no other conclusion.

* * * *

THE PLAGUES OF ANTIQUITY NO LONGER EXIST

In a recent documentation of ancient veterinary history, Leclainche (*Histoire de la Médecine Vétérinaire*, 1936) points out that the plagues of man and animals that ravaged Oriental and Occidental civilizations during and before the Middle Ages cannot be identified as any disease known to modern science, even though due allowance is made for the fact that those who recorded the symptoms were not competent writers on medical subjects. The inference drawn is that old contagions vanish and new ones appear through long stretches of time.

* * * *

CAUSE OF QUACKS

Who is to blame for the continued existence of the charlatan? It would probably be just to reply, the doctor rather than the patient. We may accuse the sick layman of a taste for magic, of drawing false conclusions, and of a *post-hoc-propter-hoc* habit of mind; but the fact remains, when all is said, that if our therapeutics and methods of handling the patient were better, the *raison d'être* for the quack would disappear from civilization and with it, the quack himself.—*Lancet*, London.

SALMONELLOSIS IN PALMIPEDES

In a long, meticulously detailed discourse[1] on paratyphoid infections of ducks and geese, the authors begin with a highly informative history of paratyphoid organisms. The term "paratyphoid bacillus" was employed for the first time in 1896 by Achard and Bensaude to designate a bacillus closely related to *Bacillus typhosus* now known in the literature as *Erberthella typhi,* casual organism of typhoid fever in man. Later (1900) Schottmüller, Brion, Kayser and others classed other organisms in the group which they attempted to identify as A, B and C. A and C play no part in animal pathology, while paratyphoid bacillus B, on the contrary, is of imminent importance.

Salmonella suipestifer (B. suipestifer), (B. cholera suum) isolated by Salmon and Theobald Smith in 1886 from hogs dead of hog cholera; the bacillus of Gärtner identified in 1888 as the cause of meat poisoning in man; the bacillus causing a gastro-enteritis isolated by Noble in veal; and the *Salmonella abortivo-equinus* (B. abortivo-equinus) isolated by Kilborne and Smith in 1898, were the organisms that Lignières placed in the B group (*S. schottmülleri*), and for which was coined the name Salmonella. The classification of these varies somewhat with the different authors. It was not until 1931 that the International Commission of Microbiology placed paratyphoid A (*S.* paratyphi) and the bacillus of Eberth in the category. At the same time, American bacteriologists classed *B. pullorum* and *S. gallinarum* (B. typhi gallinarum) in the Salmonella group, although the latter two do not by right belong to it. They do not conform to the stated requirements, as neither is mobile nor reduces neutral red. *S. gallinarum* does not form gas in sugar media, and *B. pullorum* does not ferment maltose. Moreover, while all of the Salmonella of fowl are pathogenic for man, these avian typhoid organisms are entirely harmless for man, notwithstanding the consumption of large quantities of infected eggs.

The organisms possessing the cultural and biochemic characteristics interesting veterinarians are *Salmonella schottmülleri, S. enteritidis* (Gärtner), *B. enteritidis breslaviensis* (Aertricke), *S. anatum, S. suipestifer, Abortiva* (var. equine and ovine), and the S. *typhimurium.* Essentially, the differentiation of these is based upon reactions of sugar media. The authors carried on extensive studies to appraise the observation of Bergy, Standfuss and others, by using various specimens and media. The results are recorded on extensive tables, including identification by means of serological tests. The latter have led to more perfect differentiations. In 1934, Standfuss pointed out that in veterinary medicine, the need of a differentiation has never been presented, although Salmonella affecting fowl are of great concern in public health. They can be dangerous, toxi-infections and cause fatal, acute, gastro-enteritis in man through the ingestion of infected meat and eggs. Eggs, badly preserved and meat of sick fowl are particularly dangerous.

The eggs of ducks and geese are especially infective. Improperly cooked fowl liver is most dangerous. Intoxications from pigeons and chickens are less numerous. Eggs of infected Palmipedes soiled with excrement and exposed to warm temperatures are highly infective. The organisms penetrate the shell to the white and yolk of the soiled eggs. In other instances, the egg infection is of ovarian origin. Paratyphoid B survives in refrigerated eggs. From the standpoint of public health, it is essential to kill and burn infected fowl. Laboratory workers may become gravely infected.

Salmonellosis is acute and subacute. In ducklings and goslings the mortality runs as high as 90% to 95%. It is less acute and fatal in adults. It is the "keel disease" of Rettger and Scoville. The disease may appear at the age of six days in the form of a diarrhea and extreme prostration, killing in several hours in many instances. The lesions are septicemic alterations. The few

[1] Lesbouyries and Berthelon, 1936. Salmonellosis in Palmipèdes. *Recueil de Médecine Vétérinare.* 112:4, April, 1936. Abstracted.

victims that recover are carriers of the organism and these may become suddenly stricken and die in several days or longer, showing diarrhea and enteritis.

Diagnosis.—In addition to the clinical symptoms (diarrhea, prostration, high mortality), fruitful bacteriological examinations are made on the living (eggs and excrement) and postmortem from the ovaries, testicles and various organs. The egg shell is contaminated with the excrement contacted in laying, which, as stated above, enters the content of the egg itself.

Treatment.—The medicinal treatment consists of general and intestinal antisepsis. Although not effective in the acute case, it overcomes the danger of carriers to the susceptible co-habitants and to man. Vitamin E should not be lacking in the feed.

Prophylaxis.—In disease free flocks, care must be exercised in adding new fowl or progeny of infected eggs. New purchases should be serologically tested (agglutination) and only non-contaminated eggs for hatching should be accepted. Where the disease exists, the burning of carcasses and special care in collecting and disposing of excrement is taken. In the course of an outbreak, vaccination of the healthy fowl gives a favorable result and, of course, thorough disinfection is not omitted.

[The obvious importance of this brief extract of a long report on paratyphoid infection lies in the fact that these diseases are extremely dangerous for man, and may and probably are frequently mistaken for pullorum disease, which is of no particular importance in public health.—Ed.]

TODAY

Today is your day and mine, the only day we have, the day in which we play our part. What our part may signify in the great whole we may not understand; but we are here to play it and now is our time. This we know: it is a part of action, not of whining. It is a part of love, not cynicism. It is for us to express love in terms of human helpfulness.—*David Starr Jordan.*

PRINCIPLES OF CANINE NUTRITION

By natural constitution the dog is a carnivore. The basis for dog food, therefore, should be meat.[1] Raw meat is always to be preferred to cooked meat. The former, aside from being preferred by the dog generally, is more digestible than the latter. The flesh of the various meat animals is approximately equally suitable. Horse meat has no injurious effects. The feeding of bone is indicated to meet the calcium requirements of the body, but the tubular bones (of poultry and game animals) should be rejected. Excess feeding of bone causes constipation. Fresh fish and the heads of fish are suitable for feeding. Salted fish (pickled herrings) must never be fed. The dog is very sensitive to sodium chloride. Dog food, therefore, must never be salted. Pepper, caraway, and other spices, likewise, possess a deleterious effect. Offal from game, the heads of poultry, rabbits and hares, together with the feathers or fur are proper occasionally. Milk is the natural food of young animals during the first month of life. Older animals should not receive milk in large quantities, because it tends to weaken the tone of the bowels and to lower the resistance to disease. The feeding of bread soaked in milk is especially to be avoided.

The purpose of feeding vegetables is not so much for their nutritive value, as for their stimulating action upon the peristalsis and their action as roughage to bring about satiety, a condition which is often impossible to achieve with meat alone. The feeding of vegetables in small portions is valuable on account of the vitamin content, but since vegetables are usually refused by most dogs, they should be fed finely ground, either raw or boiled, and mixed in the ration. Kitchen offal from green vegetables and roots is very desirable. The feeding of vegetables is not absolutely essential in the nutrition of the dog.

The addition of cracked and ground cereals (rice, oats, barley, rye, wheat) to

[1] Koch, W., and E. Käb, 1936. Richtlinien für die Ernahrung des Hundes; (Guide to Canine Nutrition.) *Tierärztl. Rundsch.*, 42:7, pp. 123-26. Abstracted.

the ration has stood the test. Potatoes have very little nutritive value; moreover, they are difficult to digest. Nevertheless, they may be given occasionally, when mixed with other food. Legumes (beans, peas, lentils) are of high nutritive value, but are difficult to digest. For this reason, they should be fed sparingly. Bread and bakery ware should be fed in small quantities only, and always dry. In general, bread and fancy bread are not conducive to digestion. Sweet pastry, sugar and chocolate are exceedingly unsuitable as dog food. Dog biscuits containing flour, meat scraps, bone meal and vitamins are quite wholesome. Nevertheless, dog biscuits should not constitute the sole diet for dogs. A supply of them may, however, be kept in readiness, to use when traveling or exhibiting or at any occasion when other food is not available.

The routine feeding of table scraps is apt to cause illness in dogs. Especially objectionable is the highly seasoned offal from hotels and restaurants, in particular the gravy from roast meat.

Meat and bones should preferably be fed raw. Cereals and vegetables should be fed c· oked. The amount of food, the ingred'ents of the ration and the hour of feeding must conform to the age, size and purpose of the dog. Regular exercise is absolutely essential for normal digestion. Any sudden change in the mode of diet is to be avoided, because it may lead to digestive disturbance, even if the food is perfectly wholesome. Fresh water is needed for drink. The water should be renewed twice or thrice daily.

For a mature dog, the proportion of meat in the ration should be about one-third or one-half the meal. Dogs like variety in food. The amount of food depends upon the size of the dog. Very large dogs should receive 1,000 to 1,500gm. daily; medium sized dogs should receive 400 to 500gm. daily; small dogs should receive 200 to 300gm. daily. Certain deviation from this rule may be justified by individual food requirements and the varying appetite of dogs. In case of doubt, the lower figure should be followed. Damage to health results quicker from overfeeding than from underfeeding. A complete fast day once a week has been found conducive to good health. A dog used to one feeding a day will not beg at other hours of the day. The offering of tid-bits at any other time than the regular meal hour is not desirable. In the interest of the training of the dog, it should never be tolerated at all from strangers.

Working dogs (dogs used for hunting, racing, scout duty, police work) should not be fed food which is difficult to digest and which merely acts as ballast in the intestines. Legumes and potatoes, particularly, are to be avoided. Meat should predominate in the ration. In cold weather, fat is to be added.

Growing dogs need meat and calcium. Meat should constitute at least two-thirds of their ration. Raw meat is especially useful for this purpose. Boiling destroys certain meat constituents necessary for growth. The rearing of dogs is made very simple when horse meat is made the bulk of the ration. Milk should be given in little quantities and then preferably during the earlier months only. Continual feeding of milk is detrimental to the power and to resistance against disease. Bread soups, mealy sops and potato-soups are entirely unsuited as food for growing dogs. The bones of calves and pigs, which the dog is able to crack and chew, will supply the calcium requirement for bone formation and muscle building. Occasionally a large bone should be given for its beneficial effect upon the development of the teeth. Bone meal or food lime may be given as a substitute. The vitamin requirements are met by the addition of small amounts of vegetables and by small doses of cod liver oil. Growing dogs should be fed three to four times a day.

During the first weeks of life, puppies receive sufficient nourishment from their mother's milk, as a rule. As soon as the puppies manifest interest for other food (generally when three weeks old), fresh, raw, ground meat should be offered. This allowance should be increased proportionately to compensate for the gradual drying

up of the mother's milk. The feeding of fresh viscera, liver, spleen, heart, is very beneficial at this stage. Puppy biscuits may be given to add variety. Diluted milk and later water, should be offered as drink. Puppies should be fed two to five times daily. When the milk supply of a bitch ceases, due to illness, or when the bitch dies, the artificial rearing of the puppies during their first two weeks of life is a very difficult undertaking. After this period, the feeding with milk powder may be attempted. It is to be kept in mind that the powdered milk must be diluted less, or when fresh milk is to be used, cream should be added, to make the milk conform more nearly to bitch's milk in fat and protein content.

To avoid overloading of the intestines, a meat diet with very little cereal and vegetable in the ration, is to be recommended for pregnant and nursing bitches. During the last days of pregnancy the feeding of bones should be avoided.

For older dogs, the use of meat in the diet should be restricted. The white meat from hogs, calves, rabbits, fish may be used. Bones should be fed sparingly, because often they cause obstinate constipation in aged dogs.

Dwarf dogs are subject to adiposis and are liable to develop digestive disturbances. Their meals should be lean and easily digestible. The food may consist of white meat, occasionally an egg, liver or dog biscuit.

General rules for feeding sick dogs are as follows: In gastro-intestinal diseases, dogs may be fasted up to three days. Small amounts of water may be given, but no milk. Raw meat and spices are to be avoided. Red wine and egg, minced liver, gruel should be offered prudently. In cases of obesity, strictly regulate the hours of feeding. Tid-bits between meals are not to be allowed. Potatoes, green vegetables and fruits are to be substituted for bread and cereals. In renal diseases, salt, salted food, spiced food must be avoided. Some raw or cooked meat may be fed, but never roast meat. White meat and fresh fish is to be preferred. There are no restrictions as to the feeding of fat, cereals and vegetables. Instead of water, dilute tea may be given in small quantities repeatedly. To build resistance to distemper, meat should predominate in the diet. Bread and milk in large amounts are to be avoided. To guard against rickets, the meal should consist of much raw meat, occasionally fresh liver, green vegetables and cod liver oil. Convalescing dogs must receive easily digestible food, red wine with egg, egg-cognac, ground liver, spleen, cooked veal, raw meat in small quantities.

SUMMARY OF 155 REPLIES TO POULTRY DISEASE QUESTIONNAIRE[1]

Question

Do you like poultry practice?

Yes	118
No	13
No answer	24

Has your poultry practice increased or decreased in recent years?

Increased	67
Decreased	29
No change	35
No answer	24

Do you regard your knowledge of poultry disease sufficient to give farmers accurate diagnostic assistance as well as information regarding the best prevention and control?

Yes	48
No	58
Desire more knowledge	31
No answer	18

Are you conducting autopsies on fowls for your clients or are you referring poultry problems presented by your clients to someone else?

Conducted	123
Referred	10
No answer	22

Would you be interested in taking an active part in poultry clinic to be held in your locality?

Yes	117
No	19
No answer	19

Are poultry remedy salesmen active in your locality?

Yes	113
No	10
Moderately	15
No answer	17

Of the 155 veterinarians replying, 16 are not engaged in practice and therefore answered very few of the questions.

[1] From the Division of Animal Pathology and Hygiene University of Illinois.

Air Conditioning for Veterinary Offices and Hospitals

By FRED MERISH,
Pompton Lakes, N. J.

FEW realize the nearness of air conditioning for homes and offices; but when one is reminded of the rapidity with which mechanical refrigeration supplanted the old fashioned ice boxes, or how quickly practically all picture theatres adopted air conditioning once it was made available to them, it is easy to visualize a time in the very near future when it will be as difficult to rent an office or a home that is not air conditioned, as it is now difficult to rent an apartment in the city that is not equipped with electrical refrigeration for the kitchen.

Sooner or later somebody's salesman will try to sell you air conditioning. To help you listen understandably to a salesman's proposition, to protect you against unwise purchases, we present this bird's eye view of commercial weather-making—a general classification and analysis of air conditioning.

Air conditioning has three classifications:

1. Summer air conditioning or cooling
2. Winter air conditioning
3. All year round air conditioning

Summer air conditioning is important to the business end of professional life because people are accustomed to a warm interior in winter. A cool interior in summer is as yet a novelty and attention-attracter. It creates word-of-mouth favorable advertising, builds good will and prestige. One may minimize investment by buying only summer cooling although with some systems the combination of summer cooling and winter air conditioning or all year round conditioning may be purchased reasonably because the same conditioner suffices for summer and winter.

SUMMER air conditioners perform four functions: (1) filtering the air with bronze wool or fibre filters through which the air is circulated, (2) circulating the air by fan, (3) cooling with cooling coils over which the air is blown and (4) de-humidifying with air dryers. Winter air conditioners filter, circulate, heat and humidify the air.

The conditioning apparatus is encased in a metal jacket for placement in the basement or wherever desired. The compressor for cooling or the heating plant may be placed at a distance from the air conditioning apparatus, connected only by small copper pipes. This flexibility of location simplifies installation.

Winter and summer conditioners comprise three systems:

1. The self-contained unit. This is a cabinet conditioner housing the compressor for mechanical refrigeration, filters for cleaning, fan for circulating, coils for cooling or heating and screen drip for humidification.

2. Remote control system. Designed primarily for limited floor space. This unit may be placed anywhere, on the wall, hanging from the ceiling, recessed in the wall flush with the surface or on vacant shelving. The compressor may be installed in the basement, in a closet or even in part of the office partitioned off. The flexibility of these units adapts them to unusual conditions, structural and otherwise.

3. The central duct system, which provides for placement of all the air conditioning apparatus in the basement or other place outside the office, the air being brought to the office by means of metal ducts and grilles near the ceiling. A small space in any part of the building may hold the machinery. The central duct system is most economical where a number of offices are conditioned or where the hospital as well as the office is conditioned. In summer, the conditioner is hooped to the compressor. In winter, to the heating plant, if it is an all year round conditioner.

ONE of the biggest factors in air conditioning is humidification. By wetting or by drying the air as it leaves the conditioner, the temperature apparently rises or falls although the thermometer remains the same. When the thermometer reads 70° with 100% humidity, it feels like blood heat. By cutting down the moisture content 50% the apparent temperature drops to the comfort zone although the thermometer reads the same. In winter, the reverse condition exists. Experts say that in winter many heated offices have a relative humidity or moisture content of only 17% while on the Sahara Desert the humidity is about 20%. This air is too dry. It is unwholesome and devitalizing. The more air is heated the greater its capacity to hold moisture. The heated air hungry for moisture, seeks it where it can find it, from the human body, furniture, plants, etc. This explains why plants languish in steam-heated interiors, furniture often falls apart, book bindings disintegrate, throats and nostrils feel dry. A comfortable humidity is around 45%.

Water pans on radiators in homes or offices are inadequate humidifiers. It takes about five gallons of water daily to humidify a large room properly. Air conditioning, by wetting the air automatically, makes it feel warmer, even though the thermometer reads the same. It costs less to operate air conditioning than a straight heating installation because humidified air at 70° feels warmer than dryer air at higher temperature, therefore, less fuel need be burned to afford comfort.

OPERATING expenses depend largely on the cooling medium and whether the office only or the entire building are being air conditioned.

There are four mediums for cooling.

1. Direct expansion, using standard refrigerants, such as freon, methyl chloride or brine, which are circulated through cooling coils with a compressor. A fan blows over the cold coils, the refrigerant within extracts heat from the air.

2. Well water not warmer than 50° F. may serve as a cooling medium. A pump circulates the water through the coils where it functions as a refrigerant and runs to sewer. Well water, costing nothing, minimizes operating expenses, but if the salesman suggests drilling a well to cut maintenance, think twice. The well driller may strike water at 100 feet, 500 feet or never. If he drills through rock it may cost $8.00 a foot. Consult a well driller before considering well water conditioning. If a well is already dug or a cold stream available, you're in luck, if the source doesn't run dry. If the water isn't cold enough it may be pumped to the surface and cooled to satisfactory temperature in an ice bunker or with motor-driven condenser before spiraling through cooling coils in the conditioner. But the cost of these operations may exceed direct expansion with compressor and refrigerant.

3. City water may be used. Usually it isn't cold enough. In the north city water runs around 70° F. Water bills run high when city water is used for cooling. In one city the air conditioning equipment consumed so much tap water that shortage for household purposes was feared so an ordinance was enacted necessitating the erection of cooling towers or tanks to recirculate the water. This means considerable saving and is worth consideration wherever city water is being used for summer cooling.

4. Chemicals that absorb moisture from the hot air, de-humidifying it, provide another cooling medium. A fan circulates the de-humidified air through ducts to the offices or rooms. Chemicals used are silica gel, activated alumna, lithium chloride or calcium chloride. Efficient equipment of this kind is expensive and usually operated by gas.

ALL interiors are figured differently, depending on the wattage of light bulbs, wall thicknesses, average number of visitors per day, size of windows, whether awnings top windows, etc. A one-ton compressor cools the equivalent of one ton of melting ice per day or absorbs the equivalent of 12,000 b.t.u.'s per hour. Heating

engineers have figured that an inactive person radiates 400 heat units per hour, a one horse-power motor 2,546 heat units per hour, a gas range 6,000 units per hour and so on. Totaling the radiation of all elements, they supply equipment capable of absorbing this heat and maintaining a cooling differential. Summer air conditioners are designed for maximum temperatures. In the north a cooling differential of 15° with outside temperature 95°. Winter air conditioners in the north are designed to maintain 70° with zero outside.

Manufacturers predict a big increase in sales of summer and winter air conditioners for professional offices. Some conditioners on the market are good, some not so good, some adequate under certain conditions, inadequate under others. No matter where, when or what you buy, select a reliable product and have a competent survey made to assure an efficient installation.

TETANUS IN A HEIFER

The illustration shows a case of tetanus in a two-year-old pure bred Guernsey heifer, which I think interesting. My attention was called to this case October 7, 1935. This heifer freshened September 21, retained the secundines which were with

difficulty removed, partially, on the 23rd and completed the 30th.

This heifer is a pure-bred, No. A926257. She developed stiffness and rigidity the 3rd to 5th of October, and by the 7th her back was arched and rigid, jaws firmly locked, tail elevated, had tucked up appearance, was constipated and the urine scanty.

October 7th, I managed to give a cathartic, via the stomach tube, and a hot douche. The next day the cow seemed brighter. Antitoxin and a sedative was given on the 8th, 10th, 17th and 19th. On the last date, the masseter muscles were massaged and response was prompt, the jaws relaxing, movement of the tongue ensuing, finally she began drinking and eating greedily. The photograph was taken November 8th. At this time she was a little stiff and stilty in action, and she had some difficulty in getting up and down in a box stall. From this time on improvement was rapid, and she was soon giving two and one-half gallons of milk at a milking.

R. C. MYLNE.

McMinnville, Oregon.

SCREW WORM CONTROL WORK EXTENDED TO SOUTHWEST

The Southwest will participate this year in the U. S. Department of Agriculture campaign to control the screw worm. Last year the campaign was limited to the Southeast. The screw worm has been a serious livestock pest in several southwestern states since the middle eighties. Until it suddenly invaded an entirely new territory, creating consternation among farmers and stockmen unfamiliar with it and threatening to spread even farther north and east, no federal funds were appropriated for control work.

A special appropriation of $460,000 is available for both investigation and control work. Most of this fund will be spent to show farmers and stockmen how to protect their livestock. Medicines for treating wounded and infested animals and materials for pens and chutes will be furnished only for the official demonstrations that are an important part of the campaign.

The primary purpose of the new campaign is to convince farmers and stockmen of the necessity for adopting as part of their routine operations the practices and methods that have proved effective in controlling this costly pest. Screw worms lay their eggs in spots of blood on animals that have been wounded, even very slightly.

One important way to control the pest, therefore, is to prevent such wounds by keeping animals as free from ticks as possible, by taking special care and using special instruments for such necessary operation as shearing, branding, de-horning, ear-marking, and castrating, and by breeding animals at such times that the young will be born at fly-free seasons. Experienced operators will demonstrate the use of pine tar oil and repelling flies from wounds and of benzol for killing worms in infested wounds.

PYOMETRA IN A SCOTTISH TERRIER

Pyometra exists only in sexually mature bitches that have passed through one or more periods of estrum. In most cases, there is a history of failure to conceive, or that conception has taken place with resultant birth of immature offspring.

Numerous terms have been applied to this condition, such as, septic metritis, purulent metritis, chronic metritis, and chronic pyometritis; all referring to a condition in which there is an accumulation of pus in the uterine cavity.

In most cases any treatment other than hysterectomy seems impractical. If drainage is resorted to, in most instances, the condition will recur. Bitches that have once been affected are usually sterile.

A Scottish terrier, nine years old, was brought to the veterinary clinic of the Kansas State College May 9, 1936. According to the owner she had whelped January 1, 1936, one immaturely developed pup. Several weeks after whelping, and until hospitalized, a slight, intermittant, vaginal discharge, sanguinous in nature, was noted. Just previous to admittance, frequent vomiting had occurred.

The animal was depressed, and manifested clinical evidence of a toxic condition. Both the temperature and pulse rate were increased. The abdomen was distended and somewhat pendulous. No definite diagnosis could be made by palpation. A fluoroscopic examination revealed a large object in the region where the uterus should be. An exploratory laparotomy was decided upon.

The animal was placed in dorsal recumberancy, and the operative area shaved, and painted with tincture of iodine. A median line incision was made as in spaying. The horns of the uterus were found to be greatly enlarged, the right horn approximating four inches in diameter, and the left horn about half as large. The body of the uterus was relatively small. The broad ligaments were thickened and dark in color.

The ovarian arteries were ligated with catgut suture. The body of the uterus was ligated in two places and then severed between the ligatures. To prevent contamination, the uterine stump was cauterized with liquefied phenol and then neutralized with alcohol. Interrupted catgut sutures were employed to close the abdominal incision, and a sterile pack placed over the wound.

Post-operative treatment consisted of intravenous injections of glucose and physiological saline solutions in 50 cc amounts. The temperature returned to normal and the patient made a prompt recovery.

O. E. Myrah.

Manhattan, Kans.

MUCH OF TB MAP NOW WHITE

The U. S. is winning the campaign against tuberculosis. The "TB" map issued by the Bureau of Animal Industry shows progress. The white areas indicate practical freedom from tuberculosis (less than 0.5 percent as shown by official tuberculin testing) and are known as modified-accredited areas. On Aug. 1, 1930, only three States had all their counties "accredited" and on May 1, 1934, there were 13, but the number now is 40. All the white areas are a development since 1923, when 17 counties in 4 States were designated as the first modified-accredited areas.

Of the eight remaining states not in the modified accredited area, one, South Dakota, is in the Middle West, one, California, is on the Pacific Coast, and six, New York, New Jersey, Pennsylvania, Maryland, Vermont, and Rhode Island, are in the northeastern group of states.

LAMINITIS IN HORSES

Laminitis is a simple inflammation of the sensitive laminae of the feet, characterized by the general phenomena attending inflammation of the skin and mucous membranes, producing no constitutional disturbances except those dependent upon the local disease, and having a strong tendency, in severe cases, to destructive disorganization of the tissues affected. It is a disease principally of solipeds but is seen also in cattle. The affection starts as a severe hyperemia of the sensitive laminae followed by exudation with active proliferation in the well-developed layers of the rete. This is followed soon by a separation of the hoof from its matrix. This is favored by the weight of the body. Within 24 hours after the onset of laminitis the parts are reddened and swollen.

The causes may be divided into predisposing causes and exciting causes. The predisposing causes are many and are variable. One of the outstanding predisposing causes is flat, pointed, badly formed feet. This is favored by mechanical irritation of the sensitive structures from overwork, high speed and poor shoeing. Rapid work after prolonged confinement is a very common cause. One attack impairs the functional activity of the affected tissues and renders them more susceptible to subsequent inflammation. The exciting causes are production of toxins in the body following colic, diarrhea or food poisoning. Feeding certain kinds of grain such as barley, wheat, and corn, particularly over feeding, is sometimes followed by laminitis. Frequently, parturition is the cause of this disease. Chilling the surface of the body, particularly when bathed with perspiration also may cause it. Other causes such as overexertion, exhaustion concussion, and metastasis play a rôle in the causation of laminitis.

The general symptoms usually start with interference with locomotion. As the lameness develops the pulse becomes full, hard, and strong; the temperature soon rises, reaching 105° to 106°F. The respiration becomes rapid, the nostrils are widely dilated, and mucous membranes are highly congested. The facial expression is indicative of acute suffering. The body is more or less bathed in sweat. Diarrhea may or may not be present. The urine is scanty and highly colored with an increase in the specific gravity, owing to the water being eliminated by the skin instead of the kidneys. The appetite is impaired and sometimes complete anorexia is present. The affected feet are hot and dry and are relieved as much as possible from weight bearing. Tapping with a hammer or causing the animal to stand upon one affected member causes intense pain. Any one or more of the feet may become the subject of the disease although it is more common in the fore feet, except in cases due to parturition, where the hind feet are more frequently involved. If only one foot is affected the symptoms are mild, there being no loss of appetite, no increase in pulse or temperature. The weight of the body is borne upon the opposite foot and the affected one is held extended, repeatedly raised from the floor and replaced. When made to move the affected foot is held in the air or placed on the ground and quickly removed as the other foot is advanced. Progression in a straight line is easier than turning. When both fore feet are affected the lameness is well marked, the animal nearly immovable. When standing, the head is down or rests upon the manger to afford support to relieve the painful feet. The fore limbs are placed well forward to put the weight upon the heels, where the sensitive tissue is less involved. If the animal is forced to move, which he does not do voluntarily, he exhibits great pain and lameness. If he should step upon an uneven surface he stumbles painfully. In attempting to turn the animal his head will be drawn around before he moves his feet, and it is nearly impossible to back him. In the majority of cases the animal stands till the disease is over, but if recumbency is voluntarily assumed it will usually be persisted in as it affords relief. Some cases will not remain in the recumbent position even after forcing them to lie down. When in the recumbent position the animal usually prefers to lie broad side. In this posi-

tion the general symptoms subside greatly, and it is with difficulty that the animal is made to rise. When it does get up it shifts the weight of the body rapidly from one foot to the other until they become accustomed to the weight. Exercise relieves the pain somewhat but such relief is only temporary. If the hind feet are affected they are, while standing, maintained in the same position as when only the fore feet are affected, but with an entirely different object in view. Instead of receiving weight they are advanced so that the heels receive most of the weight. The fore feet are placed well beneath the body so as to bear as much weight as possible. Progression is even more difficult now than when the fore feet are affected. Cases in which all four feet are affected are rare. All feet are slightly advanced and each is picked up cautiously and placed down upon the surface with the utmost care. The suffering is most acute, the appetite is completely gone and the patient remains down most of the time. Decubital sores are apt to occur.

Simple congestion of the laminae, which is erroneously called laminitis, develops rapidly; the symptoms are moderately severe, but one to three days are required for complete recovery. There are no structural changes but a moderate exudate is present. This is absorbed rapidly, leaving the parts as they were previous to the attack. In the acute forms of laminitis the symptoms may develop rapidly, or may start as a little soreness and develop into marked cases in 24 to 48 hours. The congestion may be general or start at one or more points and spread throughout the laminae. These cases run from two to four weeks. If the patient is treated properly, recovery may ensue in three to five days. The subacute form is a termination of the acute form but may be the initial form. It is characterized by the mildness of the symptoms, slow course, and moderate tissue changes. Chronic laminitis is a term used to designate the sequellae of the acute and subacute types of the malady. It is frequent in horses that have done fast track work, and in draft horses. They have "fever in the feet," at all times and are constantly sore. There is a sinking of the sole owing to rotation of the os pedis; ridges around the wall of the hoof. In walking the heel strikes the ground first and then the toe in a rolling motion showing the planter surface of the hoof. There may be serious complications following chronic founder such as, septicemia, pyemia, pneumonia, side bones, gangrene, and pumice sole.

The treatment is more varied in this disease than in any other disease, yet a large number of cases recover. Of course, the best method of treatment is prevention. Animals that are predisposed anatomically should be watched and cared for; but this is seldom done. Animals resting immediately after work should be protected from drafts or better still "cooled out." Unusual changes of shoes should be avoided, or not hastily made. If radical changes are imperative the work should be diminished. If one foot is affected the opposite shoe should be removed. The curative treatment varies with different practitioners. The animal should be kept in a warm place free from drafts. The feet should be placed in warm water to restore the flow of blood to the feet and after one hour changed to cold water until recovery is complete. A purgative should be given to unload the bowels should the cause be from a disturbance in the digestive tract. Aloin seems to work well in this case. Dieuretics are indicated also. Half ounce doses of salt petre, three times daily in water is the one most commonly used. Injections of adrenalin around the planter nerves affords temporary relief. Acetanilid has gained favor. It is given in ounce doses every six hours and one ounce every day following. Alum in ounce doses every two hours till eight doses have been given has been used with success. Bleeding gives temporary relief but has been discarded. Blood transfusion has been tried with apparent benefit—why is not known. In chronic cases a boiler plate shoe will permit the animal to return to work on soft ground.

C. S. HALLET.

Riverhead, N. Y.

Studies on So-called Cornstalk Disease in Horses—IV

By ROBERT GRAHAM[1] and BARBARA HARRIS[2]

Toxic Encephalitis or Non-virus Encephalitis

FOR many years sporadic cases of an acute encephalic disease or possibly a group of acute encephalic diseases of unknown etiology have occurred in horses and mules in Illinois as well as other corn-belt states. The syndrome is referred to as cerebrospinal meningitis, blind staggers, cerebritis, forage poisoning, etc. If horses and mules grazing in stalk fields become affected the disease is commonly called cornstalk disease. An acute epizootic equine disease clinically analogous to the sporadic disease or group of diseases affecting horses and mules occurred in Illinois during the fall and winter of 1934-35. A majority of the afflicted animals had been fed damaged ear corn or allowed to feed in stalk fields. More than 5,000 horses and mules in 38 central Illinois counties succumbed to the disease. The clinical syndrome suggested a cerebral disturbance with symptoms of varying intensity, marked by lethargy, excitement or paresis. (4, 5).[3]

A similar acute epizootic syndrome of horses accompanied by a high mortality has been recorded in Illinois on two previous occasions (1893 and 1914). (16) These two outbreaks, as well as the 1934-35 outbreak, followed a summer drouth with short pastures and a corn crop badly damaged by molds and corn-ear worms. Preceding the outbreak in 1893, seven inches of rainfall were recorded during May, June and July, while in 1914 and 1934, 5.8 inches and eight inches, respectively, were recorded for the same months, compared with a 46-year (1888-1934) average of 10.5 inches for these months. The sudden appearance and nature of the 1934-35 outbreak in Illinois called to mind the other epizootic outbreaks of unestablished etiology.

Molds Not Incriminated.—Molds on feed are commonly mentioned as a cause of the malady, although critical experimental data to support the primary relation of molds to the disease have not been presented. An experimental effort to incriminate molds in the 1934-35 outbreak proved unsuccessful. *Aspergillus* sp., *Penicillium* sp., *Actinomyces* sp. and *Botryosporium* sp. were propagated in French squares (7"x3") on corn meal acid agar. One mule and three horses were fed the above mentioned species in liberal amounts daily over periods ranging from four to 11 days, while suspensions of *Aspergillus* and *Penicillium* filtered through four thicknesses of gauze were injected intracerebrally into two mules without inducing symptoms of illness.

Negative Virus Findings.—The clinical analogy of so-called cornstalk disease to the virus type of equine encephalomyelitis (eastern and western), as well as the widespread character of the malady, prompted an examination of the brain tissues of affected horses for the presence of a filterable virus or filterable virus-like agent. The results of inoculating rabbits, guinea pigs, pigeons, mice and horses with specimens of brain tissues of more than fifty naturally affected horses failed to yield evidence of the presence of virus.[4] (6)

Negative to Toxic Anaerobes.—In addition to these studies, anaerobic cultures were made to determine the relation, if any, of *Cl. botulinum* or other toxic anaerobes to so-called cornstalk disease. A total of 27 horse brains, 10 different samples of moldy corn and fodder, and five samples

[1] University of Illinois.
[2] Illinois State Department of Agriculture.
[3] Numbers in parentheses refer to literature cited at end of article.

[4] In the search for a filterable virus, the authors were fortunate in having the cooperation of Dr. L. T. Giltner, Pathological Division, Bureau of Animal Industry, Washington, D. C.

of horse blood from moribund cases were cultured for the presence of toxic anaerobes. No evidence of the presence of *Cl. botulinum* or other toxic anaerobes was found.

Seasonal Incidence.—Since the disease occurred during fall and winter months the seasonal incidence of the 1934-35 equine malady in Illinois revealed epizootologic features which further distinguished the malady from known filterable virus types of equine encephalomyelitis. The peak of the 1934-35 death loss was recorded in late November and early December, in contrast to the virus types of the disease which, according to Haring, Howarth and Meyer (8) in California (1931), Records and Vawter (13) in Nevada (1933), and Giltner and Shahan (3) along the eastern seacoast (1933), appeared in late summer and subsided on the appearance of cold weather (Fig. 1).

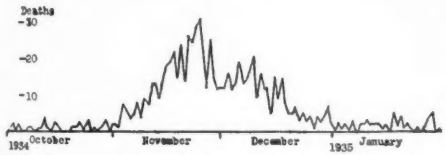


Fig. 1

Fig. 1. The incidence of Toxic Encephalitis (929 cases).

Gross Pathology.—Further differentiation between the virus type of equine encephalomyelitis and "cornstalk disease" was encountered at autopsy. Approximately 65% of the horse brains examined in the 1934-35 outbreak showed areas of softening in the cerebrum (Fig. 2). This lesion, so far as can be determined, has not been encountered in the virus type of equine encephalomyelitis, eastern or western types. The gross lesions of a toxic or non-virus encephalitis encountered in the 1934-35 outbreak in Illinois, characterized by macroscopic areas of softening in the cerebrum, have been reported in a fatal disease or diseases of horses, by MacCallum and Buckley (10) in Maryland as acute epizootic leucoencephalitis (1901), by McCarthy and Ravenel (11) in Pennsylvania as forage poisoning or so-called cerebrospinal meningitis (1903), by Friedberger and Frohner (2) in Germany as leptomeningitis (1908), while a similar clinical malady of horses was described by Schoenleber (14) in Kansas as blind staggers or cerebritis (1906), by Hickman (9) in North Carolina as epizootic cerebrospinal meningitis or staggers (1906), by Cary (1) in Alabama as cerebritis or blind staggers (1893), by Mayo (12) in Kansas as enzootic cerebritis, staggers or mad staggers (1891), and by Tiffany (15) in Illinois

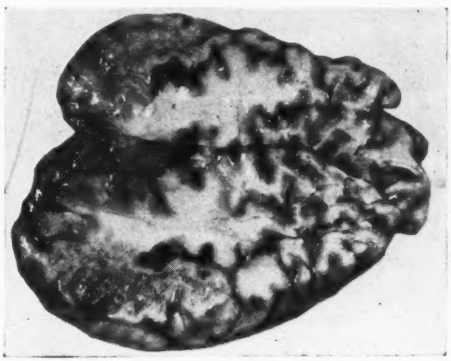


Fig. 2. Equine encephalomalacia. Longitudinal incision of cerebrum. Horse brain 16280. Note areas of softening at junction of white and grey matter.

as cerebro-spinal meningitis (1899). It cannot be safely assumed, however, that the "cornstalk disease" or toxic encephalitis of horses in Illinois in 1934-35 is identical with the disease or diseases referred to by the above-mentioned authors, even though the symptoms and the gross cerebral lesions encountered appear quite analgous. So far as can be determined, however, the diseases possess one common character; namely, an unknown or unproved etiology.

Reproduction of Disease

Feeding tests to appraise the danger of permitting horses to graze in fields of cornstalks where horses had developed the disease were attempted in an effort to reproduce the disease. In one exposure, eight horses were placed on a 55-acre stalk field near Rantoul, Illinois. Two of the experimental horses succumbed, in 23 and 27 days respectively. One of the experimental horses showed typical symptoms and at

autopsy pathognomonic cerebral lesions were found. Efforts to demonstrate virus were unsuccessful. Pasteurella-like micro-organisms were isolated from the cerebrum. The other animal died after manifesting an acute paralytic syndrome. Encephalomalacia was not found at autopsy.

In another experimental feeding exposure conducted at the laboratory, eight horses were fed damaged corn from 12 different farms where natural cases of the disease had occurred. The corn was fed continuously for 31, 31, 20, 15, 15, 19, 19 and 24 days respectively without inducing clinical symptoms of illness in any of the experimental horses. In fact, the animals gained in weight during the experimental feeding test. While negative results in a limited number of animals fed damaged corn from different farms where the disease occurred, are inconclusive, several possibilities including the following are suggested in the negative findings: the non-toxic character of the corn selected for feeding, the natural tolerance of some horses, the labile character of the toxic agent, as well as perchance, a subclinical unrecognizable type of the disease.

Pasteurella Micro-organisms Isolated From Naturally Infected Horses

The isolation of Pasteurella micro-organisms from two natural cases of equine "cornstalk disease" to be described was accomplished by inoculating brain-tissue suspensions into pigeons, rabbits and guinea pigs, as well as by inoculating rabbits,

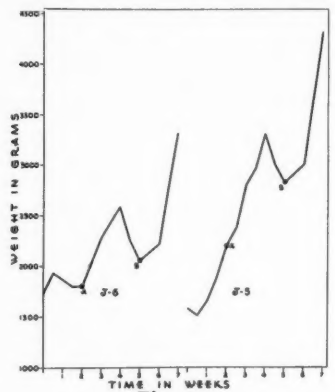
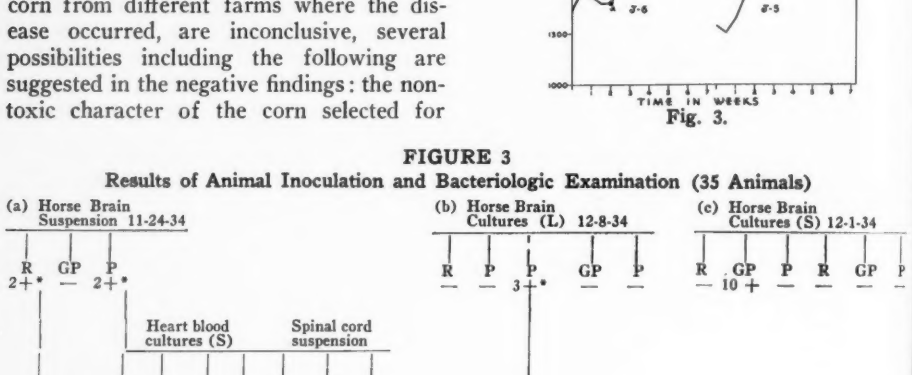


Fig. 3.

FIGURE 3

Results of Animal Inoculation and Bacteriologic Examination (35 Animals)


(a) Horse Brain Suspension 11-24-34
R GP P
2+* — 2+*
Heart blood cultures (S)
Spinal cord suspension
P GP P P R GP P
2+ 11+ — 10+* 5+ 15+ —
Spinal cord suspension
Spleen culture (S)
R GP P R GP P
1+* — — 2+* 3+* —
Brain suspension
Brain culture (S)
R GP P R P
— 5+ — 1+* —
(b) Horse Brain Cultures (L) 12-8-34
R P P GP P
— — 3+* — —
Brain culture (L)
GP P
3+ —
Heart blood culture (S)
GP
2+*
(c) Horse Brain Cultures (S) 12-1-34
R GP P R GP P
— 10 + — — — —

Key:
R = Rabbit.
GP = Guinea pig.
P = Pigeon.
* = Pasteurella isolated.
(L) = Liquid media, including tubes of 10% brain, 10% meat and 10% corn meal.
(S) = Solid media, including plain agar plates and gentian violet agar plates.
| = Subcutaneous inoculation.

— = Released healthy.
+ = Died.
Figures indicate number of days before death.

Summary:
(a) Pasteurella isolated from 33⅓% of the inoculated animals.
(b) Pasteurella isolated from 25% of the inoculated animals.
(c) All inoculated animals negative to Pasteurella.

guinea pigs and pigeons with liquid cultures[5] of these tissues. In one naturally affected horse, Pasteurella micro-organisms were isolated from the heart blood by direct cultural methods, as well as from the brain, spinal fluid and peritoneal fluid cultures via animal inoculations.

Pasteurella micro-organisms found in the brain and other tissues of naturally affected horses obviously may be present as secondary invaders, but failure to incriminate other possible etiologic agents prompted a study of the equine Pasteurella micro-organisms encountered in natural cases of the disease. In this connection the relation of Pasteurella micro-organisms to a bovine cerebral disturbance commonly referred to as "cornstalk disease" (hemorrhagic septicemia) has long been accepted. In our studies Pasteurella micro-organisms have been isolated from the brains of naturally affected cattle by inoculation of rabbits and guinea pigs with brain-tissue suspensions, although direct cultures of the brain tissue on solid media[6] have often yielded negative results. Reported observations (7) on the propagation of Pasteurella micro-organisms from experimentally infected horses likewise indicate that negative results in cultures on solid media may not be a reliable index of the presence or absence of Pasteurella micro-organisms. Furthermore, it was noted that initial discrete colonies of gram negative rods developing on solid media (plain agar and gentian violet agar plates) inoculated with brain tissue of horses naturally affected with toxic encephalitis (1934-35) may quickly become non-viable and fail to grow on transfer, or that colonies of gram negative small rods may be overgrown by bacteria and molds.

Animal Inoculation of Tissues From Natural Cases.—The results of animal inoculation and bacteriologic examination of the tissues of two naturally infected horses which disclosed the presence of Pasteurella micro-organisms are reported herein without attempting to appraise the significance of their presence. Obviously animal inoculation involving Pasteurella isolation raises the question of a possible subclinical Pasteurella infection in the inoculated animals. This danger, though always imminent, is minimized by the direct isolation of Pasteurella micro-organisms from the tissues of one of the naturally infected animals to be discussed in this report. These findings simultaneously raise the question of the significance of Pasteurella micro-organisms in the bovine host in so-called cornstalk disease.

[5] Liquid cultures refer to tubes of 10% brain, 10% meat and 10% corn meal in nutrient broth.

[6] Cultures on solid media refer to plain agar plates, 10% horse blood agar plates and gentian violet agar plates.

Inoculation of Animals with Brain-Tissue Suspension and Cultures of Brain-Tissue Suspension

Equine Specimen No. 9914:

Clinical Diagnosis—Acute cornstalk disease.

Autopsy Diagnosis—Encephalomalacia.

Bacteriologic Examination—Negative to Pasteurella microörganisms in direct cultures. Discrete colonies of gram negative rods on plain agar plates proved non-viable on transfer.

Animal Inoculation—Thirty-five laboratory animals were inoculated subcutaneously with horse brain-tissue suspension and cultures from horse brain on solid and liquid culture media. Pasteurella microörganisms were isolated from 66 2/3% of laboratory animals inoculated with the original horse brain-tissue suspensions, and, including subinoculations, from 33 1/3%. Liquid cultures from the horse brain-tissue suspension yielded Pasteurella microörganisms in 25% of the animals inoculated while a saline suspension of the brain or the growth from a horse brain-tissue suspension seeded on solid media proved negative to Pasteurella microörganisms on inoculation into animals (Fig. 3, graphic and tabular).

Bacteriologic Examination and Animal Inoculation

Equine Specimen No. 16280:

Clinical Diagnosis—Peracute cornstalk disease, terminating fatally in less than 24 hours.

Autopsy Diagnosis—Encephalomalacia.

Bacteriologic Examination—Horse brain negative to Pasteurella microörganisms in direct cultures, however, *Pasteurella microörganisms in direct cultures via liquid medium from the heart blood.*

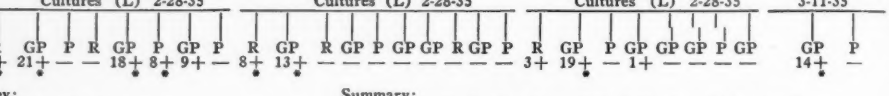
Animal Inoculation—Horse brain-tissue, peritoneal fluid, heart blood and spinal fluid cultures in liquid media, upon injection into a total of 28 experimental animals yielded Pasteurella microörganisms in 50%, 50%, 20% and 12.5%, respectively, of the inoculated animals (Fig. 4). Of particular interest is the finding that although Pasteurella microörganisms were cultivated on

direct cultures of the heart blood, only 20% of the animals inoculated with liquid cultures of the heart blood yielded Pasteurella microörganisms. In all, 10 animals, including three rabbits, five guinea pigs and two pigeons, were inoculated.

pension was injected intracerebrally into a total of 31 guinea pigs, pigeons and mice. The brain of one guinea pig that died five days following intracerebral injection was cultured in liquid media. Subcutaneous inoculation of one of the liquid cul-

FIGURE 4

Results of Animal Inoculation and Bacteriologic Examination (28 Animals)


(a) Horse Peritoneal fluid Cultures (L) 2-28-35
R GP P R GP P GP P
3+ 21+ — — 18+ 8+ 9+ —
(b) Horse Heart blood Cultures (L) 2-28-35
R GP R GP P GP GP R GP P
8+ 13+ — — — — — — — —
(c) Horse Spinal fluid Cultures (L) 2-28-35
R GP P GP GP GP P GP
3+ 19+ — 1+ — — — —
(d) Horse Brain Cultures (L) 3-11-35
GP P
14+ —

Key:
See Key to fig. 6.

Summary:
(a) Pasteurella isolated from 50% of the inoculated animals.
(b) Pasteurella isolated from 20% of the inoculated animals, as well as by direct cultural methods.
(c) Pasteurella isolated from 12.5% of the inoculated animals.
(d) Pasteurella isolated from 50% of the inoculated animals.

Isolations were secured through one rabbit and one guinea pig. A comparable percentage of isolation via animals has been experienced in inoculating pure cultures of Pasteurella microörganisms into laboratory animals, suggesting the importance of inoculating a liberal number of animals to obtain conclusive results.

Spleen, Lung, Thymus, Heart Negative

Equine Specimen No. 16280:

A composite of the spleen, thymus, heart and lung tissue suspension, together with cultures from the lungs, spleen, thymus and pericardial fluid was inoculated subcutaneously into a total of 16 rabbits, guinea pigs and pigeons with negative results. The cultures were incubated 5 to 7 days at 37° C. preceding inoculation (Fig. 5, graphic and tabular).

Intracerebral Injection Positive

Equine Specimen No. 16280:

A composite sample of horse brain-tissue sus-

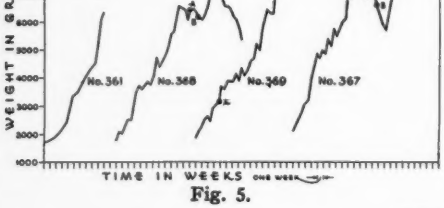


Fig. 5.

tures into a second guinea pig yielded Pasteurella microörganisms from the brain (Fig. 6, graphic and tabular).

Summary

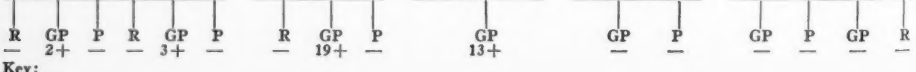
No attempt is made at this time to appraise the significance of the results which may be summarized as follows:

In one natural case of acute equine cornstalk disease (9914) in which encephalomalacia was encountered, Pasteurella micro-organisms were isolated from the brain-tissue suspension as well as from liquid cultures of the brain-tissue suspenion by animal inoculation. Rabbits, guinea pigs and pigeons received the tissue and culture inoculum while the cultures isolated were successfully passed through rabbits, guinea pigs and pigeons. Direct cultures of the horse brain-tissue suspension on solid medium (plain agar plates) proved negative to Pasteurella micro-organisms upon animal inoculation.

In one peracute natural case of cornstalk disease (16280) showing encephalomalacia, Pasteurella micro-organisms were isolated directly from the heart blood. Animal inoculation of the liquid culture of the blood yielded Pasteurella micro-organisms

FIGURE 5

Results of Animal Inoculation and Bacteriologic Examination (16 Animals)



Key:
See Key to fig. 6.

in 20% of the animals inoculated.

A composite spleen, thymus, heart and lung suspension upon injection into rabbits, guinea pigs and pigeons did not yield Pasteurella micro-organisms while liquid cultures of the lungs, spleen, thymus and pericardial fluid upon animal inoculation proved negative to Pasteurella micro-organisms. From the same animal liquid cultures of the peritoneal fluid, spinal fluid and brain yielded Pasteurella micro-organisms. Intracerebral inoculation of the brain-tissue suspension of this animal yielded Pasteurella micro-organisms from only one guinea pig, though a total of 12 received the inoculum with a 66 2/3% mortality.

Zusammenfassung

In einem Falle von natürlicher "Maisstoppelkrankheit" in dem Gehirnerweichung festgestellt wurde, konnten Bakterien des Genus Pasteurella auf Nährböden sowohl wie im Tierversuch herausgezüchtet werden. In einem anderen Falle von Maisstoppelkrankheit, gekennzeichnet bei Gehirnerweichung, der perakut verlief, wurden Pasteurella Keime direkt aus dem Herzblut Gezüchtet. Überimpfung auf Versuchstiere ergab Übertragung der Keime in 20% der Falle. Überimpfung einer Sammelsuspension aus Milz, Thymusdrüse, und Herzsack flussigkeit dieses Pferdes auf Versuchstiere

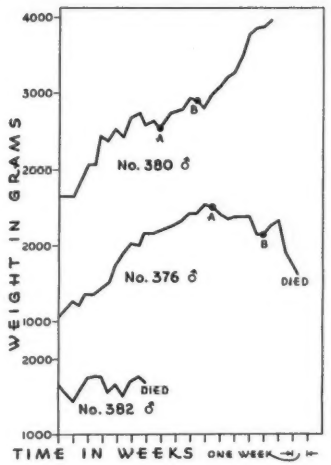


Fig. 6.

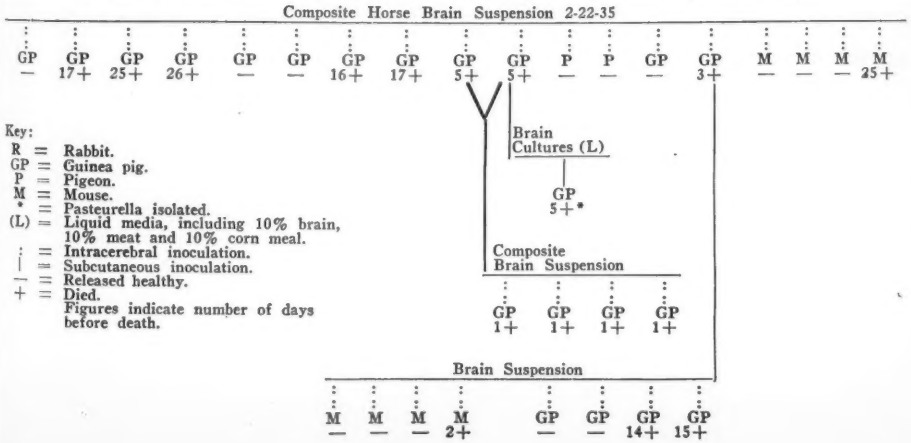
verlief negativ. Aussaat von Bauchhöhlen flüssigkeit, Rückenmarksflüssigkeit, und Gehirn auf flüssigen Nährböden lieferte Pasteurella-Keime. Intrazerebrale Impfung von Versuchstieren mit Gehirn-Suspension ergab nur einen positiven Fall von Übertragung, obwohl 12 Meerschweinchen geimpfl wurden, und die Sterblichkeit 66 2/3% betrug.

Résumé

Des bactéries du genre Pasteurella sont découvertes dans la maladie "empoisonnement par fourrage."

FIGURE 6

Results of Animal Inoculation and Bacteriologic Examination (31 Animals)


Composite Horse Brain Suspension 2-22-35
GP — GP 17+ GP 25+ GP 26+ GP — GP — GP 16+ GP 17+ GP 5+ GP 5+ P — P — GP — GP 3+ M — M — M — M 25+
Key:
R = Rabbit.
GP = Guinea pig.
P = Pigeon.
M = Mouse.
* = Pasteurella isolated.
(L) = Liquid media, including 10% brain, 10% meat and 10% corn meal.
: = Intracerebral inoculation.
| = Subcutaneous inoculation.
— = Released healthy.
+ = Died.
Figures indicate number of days before death.
Brain Cultures (L)
GP 5+*
Composite Brain Suspension
GP 1+ GP 1+ GP 1+ GP 1+
Brain Suspension
M — M — M — M 2+
GP — GP — GP 14+ GP 15+

Literature Cited

1. Cary, C. A. 1893. Alabama Agricultural Experiment Station Bulletin 43: 78.

2. Friedberger, F. and Frohner, E. 1908. Veterinary Pathology: 635.

3. Giltner, L. T. and Shahan, M. S. 1933. The 1933 Outbreak of Infectious Equine Encephalomyelitis in the Eastern States. *North American Veterinarian* 14, No. 11: 25-27.

4. Graham, R. 1936. Cornstalk Disease Investigations. *Veterinary Medicine* 31: 46-50.

5. ..... 1936. Studies in So-called Equine Cornstalk Disease. University of Illinois Animal Pathology Exchange, Jan., Feb., March.

6. ..... 1935. Results of Inoculating Laboratory Animals With Equine Brain-tissue Suspensions and Equine Brain-tissue Filtrates from Spontaneous Cases of So-called Cornstalk Disease. *Journal of the American Veterinary Medical Association* 86, N. S. 39: 778-80.

7. ..... 1936. A Note on the Influence of Cultural Media on the Isolation of Pasteurella from Equine Cerebral Tissue of Artificially Inoculated Horses. (Unpublished.)

8. Haring, C. M., Howarth, J. A. and Meyer, K. F. 1931. An Infectious Brain Disease of Horses and Mules. California Agricultural Experiment Station Circular 322.

9. Hickman, R. W. 1906. United States Department of Agriculture Twenty-third Annual Report of the Bureau of Animal Industry: 165-172.

10. MacCallum, W. G. and Buckley, S. S. 1901. Acute Epizootic Leucoencephalitis in Horses. *Journal of Experimental Medicine* 6: 65-74.

11. McCarthy, D. J. and Ravenel, M. P. 1903. A Pathology for Forage Poisoning, or the So-called Epizootic Cerebro-spinal Meningitis of Horses. *Journal of Medical Research* 10 N. S. 5: 243-249.

12. Mayo, N. S. 1891. Kansas Agricultural Experiment Station Bulletin 24.

13. Records, E. and Vawter, L. R. 1933. Equine Encephalomyelitis. Nevada Agricultural Experiment Station Bulletin 132.

14. Schoenleber, F. S. 1906. Loss of Horses in Kansas. Industrialist (later Kansas Industrialist) 32: 263-264. Abstract Experiment Station Record 17:1016.

15. Tiffany, L. C. 1899. Illinois Livestock Commissioners' Report: 111.

16. Welch, W. H. 1934-35. Personal conferences with senior author.

VETERINARY MEDICINE

Nanking, April 16.—Several kinds of veterinary medicine have been manufactured by the Government Testing Bureau of Tsingtao.

The Ministry of Industry has been requested to instruct the animal husbandry stations throughout the country to make use of the new products.—*The Inspection and Journal of Commerce,* Shanghai, China.

HADLEY QUESTIONS

Examine each of the true and false statements and decide whether it is true or false. If the statement is true, encircle the T; if it is false, encircle the F.

1. An antiseptic is used to kill germs.... T F
2. Mastitis milk is always watery in appearance ..... T F
3. Undulant fever is a disease of cattle T F
4. The passive defensive agencies are capable of completely safeguarding the body against disease..... T F
5. The *B. tetani* is a facultative anaerobe ..... T F
6. An antigen is a protein substance used to stimulate the production of antibodies ..... T F
7. Most kinds of bacteria are capable of producing disease..... T F
8. Natural immunity is produced by the use of antitoxin..... T F
9. Tetanus is a generalized septicemia.. T F
10. Brom cresol purple is used for the detection of mastitis..... T F
11. Septic sore throat is caused by *Streptococcus zoo-epidemicus* ..... T F
12. Streptococci are the most common types of bacteria found in mastitis T F
13. A definite rise in agglutination titer of cow's blood indicates Bang's disease ..... T F
14. Rabies occurs more frequently during "dog days" than at any other time of year..... T F
15. Filterable viruses can be grown on culture media ..... T F
16. Convalescent serum is comparable as a therapeutic agent to hyperimmune serum ..... T F
17. Fresh milk is a perfect food for growth ..... T F
18. The incubation period of all infectious diseases is approximately of the same length..... T F
19. Tuberculosis infection usually occurs indirectly ..... T F
20. Man is susceptible to infection with hog cholera ..... T F
21. Bovine tuberculosis is of more economic importance than mastitis..... T F
22. All infectious diseases are communicable ..... T F
23. Tularemia may be transmitted by parrots ..... T F
24. Inflammation serves as a passive defensive mechanism ..... T F
25. The horse bot is a permanent parasite ..... T F

(To be continued)

Blood Transfusion and Fluid Infusion

By E. A. HEWITT, Ames, Iowa
Department of Veterinary Physiology, Iowa State College

THE transfusion of blood has perhaps a longer and more varied history in medical literature than any other therapeutic measure, even antedating circumcision in its legendary genealogy. Doan (4) in his excellent treatise on the transfusion problem divides the history of blood transfusion roughly into seven periods. The first period dates from antiquity to 1665. The second period of short duration extending from the year 1665 to 1668; the third period comprising the time from 1668 to about 1818; the fourth period of a half century duration from 1818 to 1870; the fifth period from 1870 to 1900; the sixth period from 1900 to 1910; and the seventh and final period from 1910 to the present day.

References are made to transfusion of blood in the writings of the ancient Egyptians. Transfusion was acclaimed with real enthusiasm by many previous to the second half of the seventeenth century. Undoubtedly Harvey's researches on the circulation published in 1628 gave a new impetus to all physiological studies and one of the results was the organization of new and more successful methods in performing blood transfusion. During the period from 1665 to 1668, numerous studies and opinions were evolved relating to the practicability of the procedure. From 1668 to 1818 the popularity of blood transfusion had apparently disappeared, for during the eighteenth century there was practically no mention of it in medical literature. In 1818, Blundell began his extensive experiments on dogs that led to the publication of his physiological and pathological researches in 1824, which again brought transfusion to the notice of the medical profession. From 1890 to 1900, blood transfusions were performed with varying degrees of success on human subjects but the operation remained more or less of a novelty without general acceptance or use. With the beginning of the twentieth century there came the recognition of iso-agglutination and the phenomena associated with the incompatibility of human bloods. For a decade however, this was of interest only from a diagnostic standpoint and no application of this knowledge was made to the problem of blood transfusion, presumably because this procedure was then in one of its periodic cycles of disfavor.

Many fatalities resulting from blood transfusion occurred before the technique of blood grouping was discovered in 1901. Landsteiner was the first to observe the phenomenon of iso-agglutination as such, and showed that it was not only independent of disease but was a normal reaction of human blood. Moss, in 1910, emphasized the application of Landsteiner's principles of specific iso-agglutination, and as a result, the reasons for unfortunate reactions began to be understood. Preliminary "in vitro" tests were instituted to aid in the prevention of unfavorable reactions. The decade following 1910 showed an increase in the application of blood transfusion and many improvements in the technic and apparatus for the procedure were made. With the beginning of the World War there was added a new impetus to investigation in the field of blood transfusion as regards its usefulness, indications and procedure.

WHEN blood transfusion became a more certain and scientifically controlled therapeutic agent, physicians began to use it more freely. As a result of the successful applications and the general increase in scientific research, improved methods of procedure were developed, including means of recognizing the agglutination titre and possible additional iso-agglutinations. Better methods of preserving and transporting blood for transfusion were also devised and additional conditions were studied in which transfusion might be efficacious. Investigations were also conducted upon the importance of the white cells to the residual toxic reactions, the

ethnological and anthropological implications were investigated and the medico-legal application.

Landsteiner concluded on the basis of the iso-agglutination reactions that human blood could be divided into three groups which he designated as A, B, and C. Although several investigators (3) found exceptions to the classification of Landsteiner, it was not until 1907 that the existence of four groups was first reported by Jansky. In the same year, Moss, working independently, also discovered a fourth group, but later conceded priority of discovery to Jansky. These four groups are as follows:

Group I. The serum of this group agglutinates the corpuscles of groups II, III, IV. The corpuscles of this group are not agglutinated by any sera.

Group II. The serum of this group agglutinates the corpuscles of groups III and IV, but not of I and II. The corpuscles are agglutinated by sera of groups I and III, but not by those of II and IV.

Group III. This serum agglutinates the corpuscles of groups II and IV, but not those of I and III. The corpuscles are agglutinated by sera of groups I and II, but not by III and IV.

Group IV. This serum agglutinates the corpuscles of none of the other groups. The corpuscles are agglutinated by the sera of all the other groups.

In correlating the work of Landsteiner, Jansky, and Moss, it is necessary to remember that Landsteiner's group C is Jansky's group I, Moss' group IV; Landsteiner's group A is Jansky's and Moss' group II; Landsteiner's group B is Jansky's and Moss' group III. Jansky's group IV and Moss' group I are von Decastello, Sturli, and Hektoen's exceptions to Landsteiner's three original groups.

Schermer (7) found the four blood groups in horses as determined in man and other combinations or groups as well. The necessity for a definite blood grouping to prevent accidents from blood transfusion in the lower animals does not seem to be as apparent as in man. Hence, usually the only precaution that the veterinarian has to take in the selection of blood for transfusion is that the donor belongs to the same species as the recipient and that the donor is a healthy animal.

BY THE employment of specifically exhausted iso-hemolytic sera, Todd and White in 1911, as quoted by Doan (4), determined the survival of transfused red cells in cattle to be from four to seven days. In this instance the transfused cells acted as a foreign antigen within the same species. Both Bulliard and Isaacs, in 1924, determined approximately similar limits (one to five days) in man. Kuhl, in 1925, stated that the transfused cells were destroyed in a few hours. Panum, in 1863, and Derom, in 1926, among others, found the survival of cells in both anemic and plethoric animals to be from ten to fifteen days. Torii, in 1923, estimated that homologous cells survived for thirty days after being reintroduced into the circulation.

It would seem that the variations are so great and the problems so complicated that the length of the functional life of the red blood cells may be considered to range within wide physiological as well as pathological limits and subject to many diverse influences. Nevertheless, the experimental and clinical evidences which point toward the persistence of the transfused erythrocytes are more than sufficient to justify the procedure of blood transfusion in an attempt to remedy erythrocyte deficiency.

VARIOUS attempts, some of which have been published and others unpublished, have been made to demonstrate some agglutinative serological effect upon the white blood cells comparable to that on the red blood cells but without success up to the present. It was shown by Bond in 1919 that "in vitro" whole red cells are not toxic to native leucocytes but disintegrated red cells are highly toxic. In indirect transfusions, any injury to the red blood cells, particularly as may occur in the use of sodium citrate, may cause a disintegration of leucocytes with a resultant severe reaction.

The question of the rôle which either

platelet agglutination or disintegration may play in toxic post-transfusion reactions has been largely a matter of conjecture. While no evidence of abnormal platelet agglutinations by foreign sera was noted in the supravital studies of Doan in 1926 on the white cells, yet in certain pathologic bloods an increased tendency to spontaneous clumping was noticed.

In 1910 the toxicity of normal blood was correlated by Doerr for the first time with the phenomenon of anaphylaxis. DeKruif, in 1917, associated this serum toxicity with anaphylatoxin, developed through changes preceding or incidental to clotting. It has been definitely demonstrated that there is a toxic property of blood independent of its agglutinative and lytic properties. It was shown by Drinker and Brittingham in 1919 and earlier by DeKruif that citrated plasma in the preclot stage, which had been thoroughly freed from formed elements by prolonged centrifuging or by porcelain filtration, is singularly nontoxic, contrasting markedly with serum in this respect. Increased fibrinogen formation in pregnancy and in certain pathological conditions has been incriminated as increasing the plasma toxicity. In 1924 both Starlinger and Macht showed that there was an increased toxicity of the blood of women at the time of menstruation due to menotoxin; also that there is often a marked toxicity of the serum in cases of pernicious anemia.

In some cases there is a progressive increase in frequency and severity of these toxic reactions with successive transfusions, especially where the same donor is used. There is also a tendency for the blood of some donors to cause more reaction than that of others. Occasionally there occurs a transient polynucleosis which is a feature of the reaction resulting from the intravenous injection of a foreign protein. Sometimes urticaria and localized edema develop which may be immediately relieved by the use of adrenalin. These facts suggest that species and individual characteristics are due to differences in the proteins of the blood plasma and that the "foreign protein" character of the donor's blood may be responsible for clinical reactions.

PRACTICALLY, however, in performing blood transfusions in human medicine, three things must be kept in mind with relation to the plasma, and these same things apply in only a slightly less degree in veterinary medicine. The reasons are: First, because it has been demonstrated beyond all doubt that blood is toxic in direct proportion to the chemical alterations which it undergoes as it proceeds toward coagulation, being particularly dangerous because invisible in the pre-clot state; therefore, the extreme necessity of speed and efficiency of transfusions without anti-coagulants, and where anti-coagulants are used, thoroughness and completeness in preventing coagulative changes must be assured. Second, in repeated multiple transfusions, where sensitization against a possible foreign protein is indicated by increasing difficulty in securing suitable donors, not only must compatability of the formed elements be assured, but also the same precautions now used in serum therapy should be taken, looking toward desensitization in those instances showing anaphylactoid reactions. Third, in pathological states the plasma contains hypothetical non-specific toxins foreign to the normal state, which may act either independently, or, as catalyzers on the normal mechanisms, thus complicating the receiving of foreign blood.

It has been noted by many clinicians that the blood of certain donors imparts more benefit than the blood of others. This is particularly apparent in cases where the recipient is suffering from pernicious anemia. A certain tendency toward polycythemia in the donor is mentioned as yielding a special stimulus to the recipient.

AS TO the significances of the amounts of blood ordinarily furnished by donors Abel, Rountree, and Turner in 1914, as reported by Doan (4), demonstrated that the healthy body may withstand large blood losses, even up to one-third of the total blood volume. Rous and Wilson in 1918 determined that three-fourths of the total hemoglobin may be safely removed provided the plasma bulk is maintained. Lindhard, in 1926, found that the total

blood volume in a series of healthy men averaged 4.9% of the body weight. A liter, or one kilogram, of blood thus represents 1.4% of the weight of a 70 kilogram man, or more than one-fourth of the total blood. The figures reported for the total amount of blood in domestic animals vary considerably, however, the average results from a number of experiments show the ratio of blood to body weight to be as follows: Dog 7.2%; rabbit and cat 6.5%; pig 5%; ox 7.7%; sheep 8%; horse 9%; and chicken 8%. According to the observations of Miller (6) in 1932, the maximum quantity of blood in cattle varies between 20cc and 33.1cc per pound of body weight. The average of 81 determinations was 27.07cc per pound. Oscillations in blood volume of animals follow closely the changes in body weight. Blood volume increases during pregnancy and decreases shortly after parturition. It is interesting that a 1000-pound cow should have on the average approximately twenty-seven liters of blood. This knowledge is important so that the operator may keep well within the limits of safety in withdrawing blood. While 800 to 1400cc have been taken from a single human donor, this quantity approaches the limits of safety. An over withdrawal of blood is indicated by increased pulse and respiration, repeated yawning, deep sighing, pallor, sweating and possible collapse. Recovery is usually rapid with proper treatment. A time interval sufficient for the complete restoration of red cells and hemoglobin is essential in any donor.

THE essentials of blood transfusion are the assured delivery of proper blood in the correct amount. The technic will necessarily depend upon the circumstances under which the transfusion is to be performed.

The methods most commonly in use in human medicine are in general of two types, namely, direct transfusion by anastomosis of vessels and the indirect transfusion with or without anti-coagulants by means of syringe, or gravity method. There are certain objections to the direct transfusion of blood: It is a surgical procedure that requires considerable skill and experience, and although the operator has the flow of blood constantly under his control, he does not know precisely just how much blood he is transfusing; also this method may in some cases mean the sacrifice of the vessel used. With the modern improvement in the technics of blood transfusion, the direct anastomosis of vessels has been largely discontinued.

NUMEROUS anti-coagulants have been suggested in an attempt to overcome the danger from the chemical changes which occur as the blood coagulates. These chemical changes may occur when indirect transfusion of whole blood proceeds too slowly. Ammonium sulphate, sodium bicarbonate, sodium phosphate, ammonium oxalate, sodium sulphate, arsphenamine, sulfarsenol and hirudin have all been used as anti-coagulants with varying degrees of success. However, sodium citrate is by far the most popular anti-coagulant in use today in France, England and America. The use of sodium citrate markedly reduces the dangers of blood transfusion. The amount ordinarily used to prevent coagulation of blood, 0.5 to 1%, is well within the toxic limits. In veterinary practice a common procedure is to use a 2% solution of sodium citrate and take one part of the citrate solution to four parts of blood. In blood transfusions in sweet clover poisoning, the veterinary clinician frequently takes 100cc of a 10% solution of sodium citrate and draws sufficient blood into this solution to make the total volume one liter. Sodium citrate may cause sufficient blood cell destruction to produce allergic shock of a mild character.

Insufficient citration together with delayed and careless mixing of blood and anti-coagulant may be responsible for some of the undesirable reactions occasionally met with. It should be remembered that there is considerable difference in the coagulation time of blood of different species. The blood of the pig and chicken requires about three times the amount of anti-coagulant to prevent coagulation as does slowly coagulating blood such as that of animals

on low calcium rations. Clinically, it is noted that the blood of animals on rations high in calcium requires greater amounts of anti-coagulant.

THE dosage must be left to the discretion of the operator as well as the selection of the method of transfusing. The ordinary routes by which blood may be given to the recipient are: (a) intravenous, the usual method of choice; (b) subcutaneous and intramuscular; (c) intraperitoneal, which method possibly should be used more than at present in veterinary medicine although splenomegaly has been reported as developing in rabbits after intraperitoneal transfusion and, (d) per rectum, in cases of large hemorrhage in an infected field, the blood being introduced as a rectal drip.

When the blood is introduced intravenously the rate and pressure of introduction are the main factors to be considered. The administration should be slow and under the lowest pressure that will suffice.

CONCERNING the indications for blood transfusion Leisrink's generalization remains as true today as it was in 1872 when he said, "transfusion is indicated in all those pathological conditions where the blood, in quantity and quality, is so altered that it is unfit to fulfill its physiologic duties." The definite functions of transfused blood are: to restore the bulk of the circulating fluid; to provide oxygen and assimilable food for the tissues; to increase the coagulability of the recipient's blood; to stimulate the hematopoetic organs; and to increase the resistance to infection by its antitoxic and bactericidal properties.

An idea of some of the obscure and indirect effects of transfusion may be gained by a consideration of nonspecific cellular therapy. Maurer (5) states that to understand the nature of nonspecific cellular therapy, one must consider the nature of diseases and the natural healing processes. In diseases of organs, those cells that function specifically (the parenchyma cells) are attacked, for example such as the renal cells, the liver cells, or the cardiac muscle. The natural healing processes, however, do not arise from the parenchyma, but from the cells of the middle germinal layer, the mesenchyma, which includes all white blood corpuscles, the connective tissue cells, those of the reticular endothelium of the liver, and certain cells of the intima of the arteries. Immunizing bodies are formed in the cells of the lymphatic glands, in the bone marrow, and in the spleen.

The mesenchymal cell system, which is one of the chief defensive mechanisms of the body, bears an intimate relation to the autonomic or vegetative nervous system. As a result any disease of specific organs always has an irritating effect (stimulation or inhibition) upon the autonomic nervous system. This must furthermore produce an effect upon the activity of the endocrine glands.

The mesenchymal defensive apparatus, the autonomic nervous system, and the endocrine glands, with their reciprocal relationships and their combined action, have by far the predominating influence upon the corrective processes. Hence any therapy that will stimulate an increased activity of these systems will tend to institute healing measures. Thus, the same results may be obtained in the most varied diseases with the same treatment, as, for example, by the injection of a medicament, which will stimulate the cells of this mesenchymal defensive apparatus to the greatest action.

THE mechanisms whereby the effects of transfusions are accomplished are varied but on the whole, probably dependent upon the redistribution of fluid after transfusion. Bornstein, Wohlwill and Schirlitz (2) showed that when blood was removed from a dog and replaced by defibrinated blood, either from another dog or from a calf, the effects were, for the most part, attributable to a stimulation of the parasympathetic nervous system and of the respiratory centers. The secretions of the salivary and the bronchial glands were stimulated as well as contractions of the smooth muscle of the intestine and bladder. However, these effects were not obtained if atropine was administered previously. The

pulmonary ventilation was increased three to five times and there was a fall in the alveolar carbon dioxide. Hemorrhages occurred in the lungs and liver, and also edema was present in the lungs. The foreign erythrocytes were destroyed by the reticulo-endothelio cells and hemosiderin was produced.

Adolph, Gerbasi and Lepore (1) in 1933 found that whole defibrinated blood or suspensions of washed corpuscles caused the plasma to leave the blood stream very rapidly. The initial rate at which plasma transudation took place depended chiefly upon the volume used. Solutions of sodium chloride left the circulating blood promptly in every case. Thirty per cent concentration of glucose caused an enormously rapid but temporary shift of water into the blood. Gelatin or acacia added to sodium chloride solutions brought about a more rapid and more permanent translocation of fluid. Sodium chloride in high concentrations caused volumes of fluid to pass into the blood stream. The extra fluid was identified in the liver as well as in the blood. The speed at which the translocation of fluid occurred was calculated for each experiment. The highest rate at which water entered the circulation was 6cc per kilogram of body weight per minute. Most of the fluid translocation was complete even before the infusion had ended.

Experimental Methods

In the Veterinary Physiology Laboratories of Iowa State College routine animal experiments are performed to demonstrate to students the effects of hemorrhage, transfusion and infusion on blood pressure. The experimental methods are those ordinarily used in pharmacological and physiological studies involving the use of a long paper kymograph, mercury manometer, pneumograph, time marker and signal magnet. Three per cent pentobarbital-sodium (Abbott) administered, either intraperitoneally or intrapleurally, on the basis of 30 mg. per kilo of body weight, is ordinarily employed for anesthesia.

The general procedure in performing an experiment is to take a preliminary tracing which is assumed to be normal for the animal under anesthesia. Subsequently varying amounts of blood are withdrawn at intervals, usually beginning with 8cc to 10cc and increasing the amounts until a decided lowering of the blood pressure results. Frequently sufficient blood is withdrawn to cause the blood pressure to fall to 40 mm. of mercury. The blood is prevented from coagulating by the use of sodium citrate. In the usual procedure, the blood pressure is allowed to fall to a dangerously low level after which the citrated blood is reintroduced into the femoral vein.

Tracings taken from experiments performed on two dogs are shown in the accompanying illustrations. These tracings are representative of a large series of experiments performed in the routine teaching of veterinary physiology. Figure 1, a, b, c and d shows the effects of hemorrhage and transfusion in a male dog weighing 16.8 kilos.

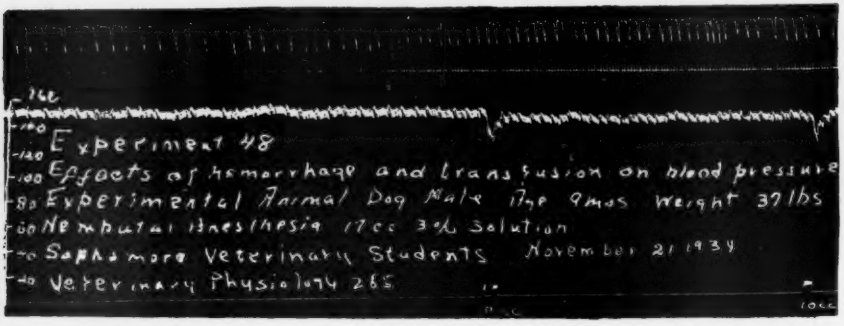

Experiment 48
Effects of hemorrhage and transfusion on blood pressure
Experimental Animal Dog Male Age 9mos Weight 37 lbs
Nembutal Anesthesia 17cc 3% Solution
Sophomore Veterinary Students November 21 1934
Veterinary Physiology 285
10cc

Fig. 1a. Normal blood pressure showing slight and transient effects of successive hemorrhages of 10cc each.

Figure 1, a and b shows that the blood pressure dropped from 155 mm. of mercury to 50 mm. as a result of a severe hemorrhage, losing 320cc of blood. The reintroduction of this amount of blood restored the blood pressure to 120 mm. Figure 1, c shows that the subsequent introduction of 370cc of 0.85% sodium chloride solution restored the blood pressure to its original level of 155 mm. An additional infusion of the salt solution amounting to 1300cc failed to raise the blood pressure above that level. Figure 1, d shows the effect on blood pressure following the removal of 955cc of blood after the animal had been made plethoric by the introduction of 1670cc of physiological saline solution. The animal, before the hemorrhage, had become extremely edematous, indicating that the fluid was leaving the circulation and going into the tissues as rapidly as it was being infused.

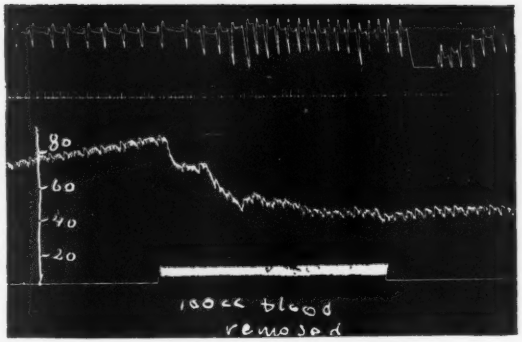


Fig. 1b. The effect of hemorrhage on blood pressure —320cc of blood removed.

Fig. 1c. The effect on blood pressure of reintroducing 320cc of blood and the further introduction of 1710cc of physiological saline solution.

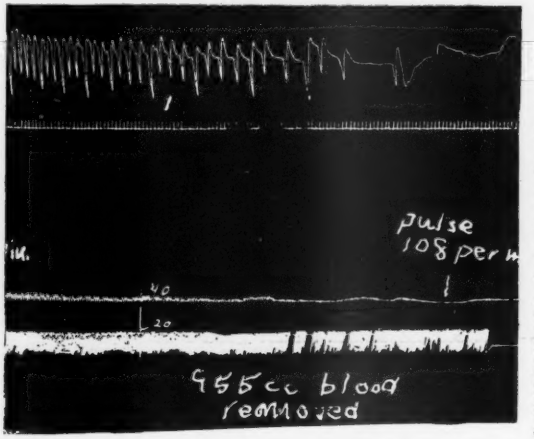


Fig. 1d. Fall in blood pressure following removal of 955cc of blood.

Figure 2, a, b, c, d and e shows the effects of hemorrhage and transfusion in an aged female dog weighing nine kilos. Figure 2, a shows that the withdrawal of 8 and 10cc of blood respectively produced no effect upon blood pressure. Figure 2, b shows the effects of the withdrawal of 218cc of blood which reduced the blood pressure from 120 mm. to 50 mm. of mercury. Figure 2, c records the effect of reintroducing 240cc of citrated blood which raised the blood pressure to 90 mm. and the subsequent infusion of 330cc of 0.85% salt solution raised the blood pressure to a new high level of 130 mm. Figure 2, d shows that the infusion of an additional 290cc of the salt solution failed to raise the blood pressure higher. This was probably due to the fact that

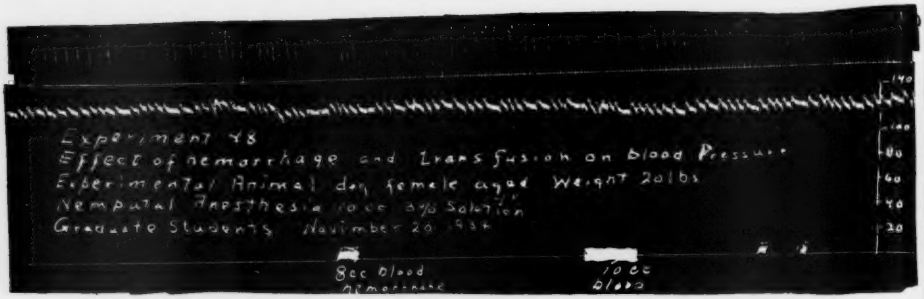


Fig. 2a. Normal blood pressure showing no effect from the removal of 8 and 10cc of blood.

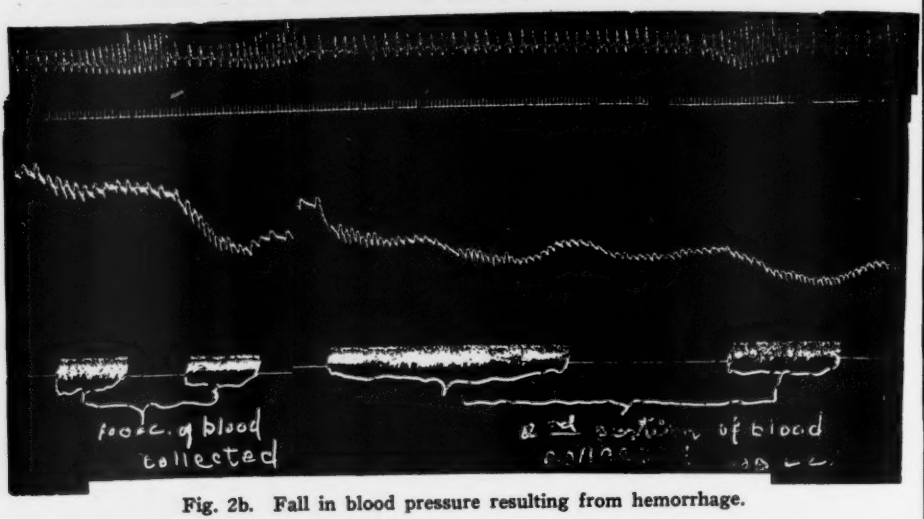


Fig. 2b. Fall in blood pressure resulting from hemorrhage.

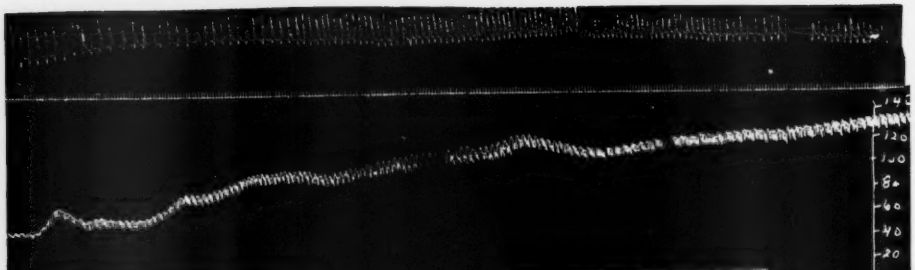


Fig. 2c. Rise in blood pressure due to infusion of citrated blood and physiological saline solution.

the fluid was passing into the tissue as rapidly as it was being introduced into the circulation. This figure also shows the effect of hemorrhage which is continued in figure 2, e which shows that the withdrawal of 630cc of blood caused the blood pressure to drop to 40 mm.

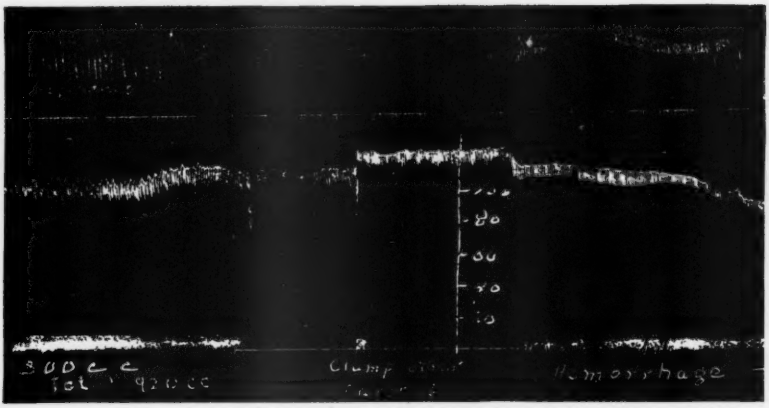


Fig. 2d. Maximum rise in blood pressure after 920cc of physiological saline solution was introduced.

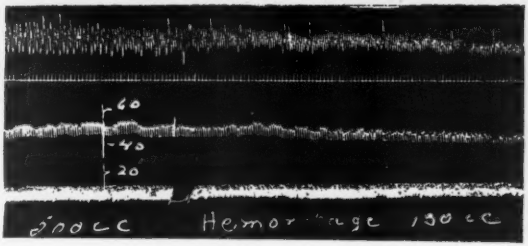


Fig. 2e. Fall in blood pressure resulting from loss of 630cc of blood.

Summary

Tracings show the effects of hemorrhage, transfusion, and infusion on blood pressure in two dogs are shown, these tracings being typical of those made in the routine teaching of veterinary physiology at Iowa State College. Slight hemorrhage has only temporary or no effect at all upon blood pressure. Severe hemorrhage may cause the blood pressure to fall to a dangerously low level. The reintroduction of citrated blood will restore the blood pressure to its previous level or may produce a new level slightly higher than the original. Further saline infusion, however, fails to produce an additional rise of blood pressure, indicating that the fluid is passing out of the capillaries as rapidly as it is being introduced. Following severe hemorrhage, similar but less enduring effects may be obtained by the use of saline infusion alone.

Zusammenfassung

Die Wirkung des Blutaustrittes, der Blut transfusion, und der Infusion auf den Blutdruk sweier Hunde wird in Kymographischen Aufzeichnungen veranschaulicht. Diese Aufzeichnungen mögen als Beispiel gelten für die Art und Weise in der der Unterricht in Tierphysiologie auf der tierarztlichen Hochschnle des Staates Iowa geleitet wird. Geringe Bluntung hat nur vorübergehende oder gar keine Wirkung auf den Blutdruck. Schwere Blutung kann verursachen dass der Blutspiegel gefährlich tief sinkt. Transfusion von Citrat-Blut bringt den Blutdruck entweder auf seinen früheren Spiegel zurück, oder sie kann ihn ein wenig über seinen vorigen Spiegel erheben. Vermehrte Infusion von physiologischer Kochsalzlösung bringt jedoch keine weitere Erhöhung des Blutdrucks mit sich. Man mag dies so auslegen, dass die Flüssigkeit Kappillargefässe ebenso schnell wieder verlässt, als wie sie hineinläuft. Die Infusion physiologischer Kochsalzlösung als Ersatz grösserer Blutverluste hat eine ähnliche, wenn auch weniger dauernde Wirkung.

Résumé

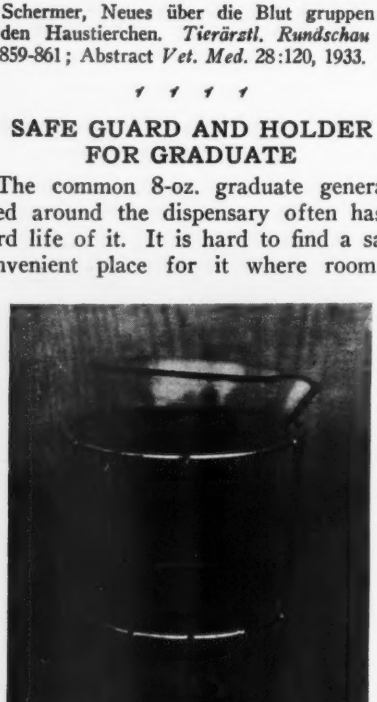
L'influence de l'hemorragie, de la transfusion, et de l'infusion sur la pression du sang est rapportée.

References

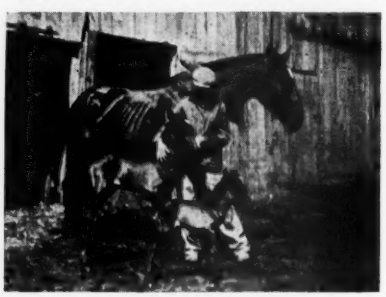
1. Adolph, E. F., Gerbasi, M. J., and Lepore, M. J. Redistributions of water following transfusions and infusions. *Am. Jour. Physiol.* 107: 647-666; 1934.
2. Bornstein, A., Wohlwill, F., and Schirlitz, K. Uber der Ersatz des zirkulierenden Blutes durch artfremdes defibriniertes Blut. (The replacement of blood by defibrinated blood.) *Arch. f. exp. Path. u. Pharmak.* 127:253-268, 1928; Physiol. Abst. 13:358, 1928.
3. Braucato, George J. Historical Blood Transfusions. Abstract *Vet. Med.* 27:322-323, 1932.
4. Doan, Charles A. The Transfusion Problem. Physiological Reviews VII:1-84, 1927.
5. Maurer, Julius. Non-specific Cellular Therapy. *Vet. Med.* 28:144-149, 1933.
6. Miller, W. T. The Blood Volume of Cattle. *The Cornell Vet.* 22:320-332, 1932.
7. Schermer, Neues über die Blut gruppen bei den Haustierchen. *Tierärztl. Rundschau* 38: 859-861; Abstract *Vet. Med.* 28:120, 1933.

SAFE GUARD AND HOLDER FOR GRADUATE

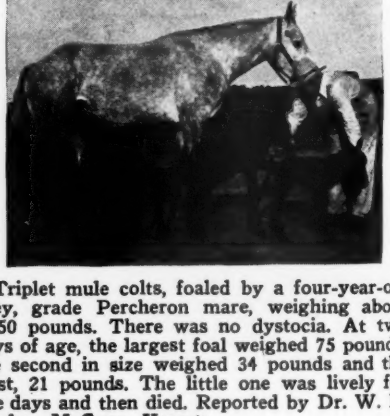
The common 8-oz. graduate generally used around the dispensary often has a hard life of it. It is hard to find a safe, convenient place for it where room is



sometimes at a premium. Get one of the inexpensive electric light bulb guards or shields. Cut the wires off close to the portion which tightens around the socket. Bend the wires out a bit and then to right angles, making a perfect bottom for the glass to rest on. Tack this up anywhere in the medicine cabinet that it is convenient. It can be bumped into with almost anything, yet the glass is completely protected. Upsetting it is out of the question.—*Bentley.*



Twin foals, born May 10, 1936, belonging to Mr. Harold Hanika, Shubert, Nebraska. At three days of age the larger foal weighed 101 pounds, the smaller, 24 pounds. It was only six hands tall. It was necessary to bottle feed it, and at last report, it was doing well. The dam is a grade and the sire a purebred Percheron. The photograph was taken by Dr. C. J. Majerus, Falls City, Nebraska.



Triplet mule colts, foaled by a four-year-old grey, grade Percheron mare, weighing about 1,350 pounds. There was no dystocia. At two days of age, the largest foal weighed 75 pounds, the second in size weighed 34 pounds and the least, 21 pounds. The little one was lively for five days and then died. Reported by Dr. W. R. Harley, McCune, Kansas.

While less famous than the skunk, the weasel possesses glands that are similar and that secrete a fluid of strong odor.—*S. N. L.*, 29:785.

The great structure of modern medicine is built upon a foundation of animal experimentation.—*Sir William Osler.*

Abstracts

ERADICATING BANG'S DISEASE

Small, Bang-infected herds, are rendered disease-free rather easily by disposing of the reactors.[83] However in large herds, chronically infected, the disposal of all positive reactors at once is impractical, if not impossible, because the buying and selling of animals is dependent upon and determined by economical factors.

DANGERS OF ANESTHESIA

Complications of the respiratory and circulatory system, arising from narcosis, are principally paralysis of respiration and collapse of the circulatory system.[84] To avoid complications, the best prophylactic measure aside from the proper selection of the method, is the careful supervision of the progress of narcosis. In order to recognize even the slightest indication of danger, the person applying narcosis must be skilled in the art of observation.

The three principal complications in narcosis are asphyxiation, respiratory disturbances and circulatory disturbances. A threatening situation may arise either at the start, or during the phase of excitation, or during the phase of tolerance.

Asphyxiation is the most dangerous complication. It is encountered almost exclusively in chloroform narcosis. The symptoms are intermission of the pulse, dilatation and rigidity of the pupil, occasionally a few muscular convulsions. Treatment—instant discontinuation of narcosis, artificial respiration; heart massage, intracardial application of adrenalin.

The respiratory disturbances are caused either by mechanical obstacles, or by reflex convulsions, or by occlusion of the epiglottis or by acapnia, or by paralysis of the respiratory centers.

The circulatory disturbances are observed, usually, after the use of halogen-containing narcotics, such as chloroform, chloral hydrate, etc. Other circulatory disturbances are caused by paralysis of the vasomotor center, also by lack of oxygen.

BLACKHEAD A MYCOSIS

Inquiring into the etiology of blackhead, Enigk[85] furnishes proof that the disease is caused by a fungus which he describes in detail, morphologically and culturally. The fungus in question is a common saprophyte of the intestinal tract of gallinaceous birds. Injury to the intestinal mucosa facilitates the entrance of the fungus into the tissue. Thus the typical lesions in the ceca and liver will develop. Other organs which are attacked occasionally are the kidneys, esophagus, crop and the airsacs. The fungus can be isolated readily from the affected organs. With the cultures thus obtained, characteristic blackhead lesions were easily induced in turkeys and chickens.

DILATION OF ESOPHAGUS IN THE DOG

Two young dogs[86] suffered from an attack of vomiting. Roentgen ray examination revealed dilation of the esophagus in the neck and in the thorax region. Between the dilated sections there was a constriction. During expiration, as well as during inspiration, a popping sound could be heard. It was produced by the movement of air and food in the dilated portion of the esophagus.

PARATYPHUS IN SILVER FOXES

Several types of Salmonella organisms are recognized as the etiological agent of paratyphus in foxes. The cases observed by deBlieck[87] and Jansen were caused by *S. enteritidis,* var. *dublin.* The symptoms consisted in rapid loss of appetite, diarrhea, great weakness, especially in the hind legs.

[83] David, H., 1936. Zur Erkennung und Bekämpfung der Bangkrankheit des Rindes; (Diagnosis and Treatment of Contagious Abortion in Cattle). *Wien. Tierärztl. Monatsschr.,* 23:3, pp. 65-72; 23:4, pp. 97-103.

[84] Heger, A., 1936. Narkoscwischen fälle; (Complications During Narcosis). *Tierärztl. Rundsch.,* 42:2, pp. 27-32.

[85] Enigk, K., 1935. Die Ätiologie der Blinddarm-Leberentzündung der Hühnervogel; (The Etiology of Blackhead). *Arch. f. Tierheilk,* 69:6, pp. 410-38.

[86] DeJong, J., 1935. A Case of Dilation of the Esophagus in a Dog (Trans. title). *Tijdschr. v. Dierzeneesk.,* 62; pp. 1248-49.

[87] DeBlieck, L., and J. Jansen, 1935. Paratyphus in Silver Foxes (Trans. title). *Tijdschr. v. Diergeneesk,* 62:9, pp. 457-64.

The autopsy revealed a distinct enteritis, hemorrhagic at times. The spleen appeared swollen, as a rule. Kidneys and liver are often degenerated. A pronounced jaundice was present in many animals. The Salmonella organisms are easily demonstrated in smears from the heart blood. Specific remedies against this disease are not known. Serum therapy is of no benefit. Control of the disease, however, is possible by vaccination. Of 275 foxes vaccinated, all except two escaped infection. The vaccination consisted of an initial injection of 1cc and a second injection of 2cc, one week later.

CHEMOTHERAPY IN PIROPLASMOSES

The curative and protective dose against piroplasmosis of dogs was found to be 0.003 to 0.01gm acaprin.[88] The curative dose of acaprin against piroplasmosis of cattle was found to be 0.6 to 0.75gm. The drug acts against the schizonts. The decline of fever proceeds parallel with the disappearance of the plasma bodies from the blood and liver. Babesiasis of cattle was amenable to treatment with the same amount of acaprin. The Babesias disappeared from the blood in one to two days. Mixed infections yield likewise to treatment with this drug. The same excellent results were obtained in the fight against piroplasmosis of horses. The dose was 0.3 to 0.5gm. The dose against piroplasmosis in sheep was 0.1gm. The application is subcutaneous. A transitory restlessness, muscular tremor, salivation and diarrhea may be observed after injection. It is advisable to support the recovery with tonics.

PHENOMENA OF HEAT IN THE DOG

Biologically the difference between human menstruation and the heat of bitches is not great.[89] It depends mostly on the intensity of action of the hormonal components. It finds its expression in the seasonal course of the cyclic processes. In order to influence the female reproductive organs therapeutically, an exact knowledge of the heat cycle of the bitch is absolutely necessary. The authors successfully treated 84 bitches suffering from various disorders of the estrus cycle, with different hormonal preparations.

VACCINATION AGAINST AVIAN VARIOLA

In two previous articles, the author[90] reported his special method of vaccination against fowl pox. Contrary to the usual plan of introducing the vaccine into receptive tissues (skin, mucous membrane), it is injected deeply into the pectoral muscles or other non-receptive tissues.

This vaccination produces no local lesion whatsoever, except an occasional variolic speck where the needle penetrates the skin. The results were excellent. The immunity starts from 18 to 20 days after vaccination and lasts nine months; after that period it fades out gradually. Egg production drops 70% the second to third week, just as from the usual method of vaccination, but this check in production lasts only about eight days. This objection can hardly be avoided as it is due to the reaction required to install the immunity. Killed virus or attenuated virus is inert, inefficacious.

When pigeon pox virus came into use, it was thought to represent true Jennerian vaccination in that the vaccine was a natural virus of low pathogenicity for chickens. The method was first used by Doyle and Minett in 1927, but the good results reported by these authors were not confirmed by American investigators. Michael, Lubbehusen, Ehlers and Johnson concluded in 1934 that pigeon pox virus does not immunize chickens. Doyle, himself, admitted in 1930-1934 that pigeon pox vaccine gave only a partial immunity lasting but four to five months.

The Pathogenicity of Pigeon Virus for

[88] Cerruti, C. J., and F. Fantoni., 1935. Chemotherapeutic Treatment of Piroplasmosis with Acaprin Bayer (Trans. title). *La Clin. Vet.*, 7, pp. 542-52.

[89] Benesch, F. and M. Kostner., 1935. Der Einfluss der Hypophysenvorderlappen und Ovarialhormone auf den Genital apparat der Hündin zur Bekämpfung der Unfruchtbackeit; (Hormonal Influence Upon the Reproductive Organs of the Bitch in the Combat of Sterility). *Münch. Tierärztl. Wchnschr.*, 86:47, pp. 553-57; 86: 48, pp. 566-71.

[90] Basset, J., 1935. Le virus des Columbins chez les Gallinacés; (The Virus of Columbinae in Gallinacae). *Rev. Vét. et Journ. de Méd. Vét.*, 87:9, Oct. 1935.

the Chicken—Chicken pox virus is absolutely non-pathogenic for the pigeon; it has been known for a long time that the reciprocity cannot be proved. But, on the other hand, pigeon pox virus is slightly pathogenic for the chicken, provided the experimental inoculation is massive. Extensive scarification and plucking of feathers and the application of a virulent type of pigeon virus will cause a benign variolar reaction in chickens.

Immunizing Power of Pigeon Pox Virus for Chickens—In a series of experiments described in detail, the author shows that pigeon pox virus inoculated into a vast skin area in chickens confers a complete resistance. But the procedure is impractical and there is nothing to indicate that it will not have the same inhibition on egg production as has chicken pox virus. The experiment proves that the immunity produced corresponds to the pathogenicity of the material employed. That is to say, while small doses of chicken pox virus establishes immunity, enormous doses of pigeon pox virus are required to acomplish the same result. Cameron of England observed that the mortality among vaccinated chickens was low among those showing the most extensive vaccinal cicartices.

From the practical point of view, Jennerian vaccination for poultry (pigeon pox) is of no use. Intramuscular homologous vaccination is the best. For the vaccination of pigeons, the same principle must be applied for the reason that chicken virus is not pathogenic for Columbinae.

ADVANTAGES OF ANTIRABIC VACCINATION

Antirabic vaccination[91] of unexposed dogs has been employed, officially, in various countries for several years. In Morocco, Algeria, Tunis, Indo-China, and Syria, thousands of dogs have been vaccinated, 30,000 in North Africa alone. These vast experiences have a value in arriving at definite conclusions. Everywhere, the results have been favorable with both the etherized vaccine of Morocco, Tunis and Syria and the formulated vaccine used in Algeria and Indo-China. Much depends upon the sanitary conditions of these colonies where there are large numbers of stray and wild animals, the population less informed and veterinarians less numerous than in metropolitan centers. It can be said, the author declares, that rabies vaccination is a sanitary measure of importance. The immunity conferred is solid and durable. If two injections may be necessary for the first vaccination, a single injection annually is sufficient thereafter.

The vaccinated dog being no longer susceptible to rabies and therefore not able to transmit the infection, it gives the owners and family the certitude of not being infected by their own dogs, which, in these countries was a common incident before vaccination was employed.

From the prophylactic point of view, if all dogs were vaccinated rabies would die out, but there is little hope of attaining this ideal. Rather than to attempt to enforce rigid laws it is better, under the conditions obtaining in them, to encourage a large number of owners to submit their dogs to the vaccination procedure—the plan being adopted in the principal French colonies.

PARASITES OF SILVER FOXES

The examination of 664 fecal samples[92] revealed ascaris eggs in 62 cases, hookworm eggs in 256 cases, coccidial oocysts in 54 cases, and eggs of *Capillaria aerophila* in 134 cases. In addition, various mite eggs and mites were found. The latter usually originated from the food. In two cases, demodectic mites were diagnosed. The ascaris and hookworm infestations were treated with tetrachlorethylene in capsules. The presence of coccidial oocysts is not in itself an indication of an existing coccidiosis, because they may have come from the food (rabbits and chicken entrails). No treatment of Capillaria worms was attempted.

[91] Plantureux, E. On the Subject of the Application in France of Antirabic Vaccination. *Revue de Médecine Vétérinaire et Journal de Médecine Vétérinaire*, 88:3, April, 1936.

[92] Klarenbeck, A., 1935. Fecal Examination for Parasites in Silver Foxes (Trans. title). *Tijdschr. v. Diergeneesk.*, 62:2, pp. 1181-82.

ICTERUS IN DOGS

The author[93] examined 35 dogs. Leptospira ictero-hemorrhagica was found in 40% of the cases. In 43% of the cases, *Leptospira canicola* was found. Icterus was observed quite frequently; chronic cases were in the minority. As to the sexes affected, 51% were males and 49% were females. The occurrence of the disease prevailed throughout the year, but the majority of the cases were observed during the fall months. Excellent therapeutic results were obtained with an autogenous serum.

TETANY IN LACTATING MARES

Nursing pony mares which were shipped from England to Holland fell ill.[94] Some became sick during the voyage and others after landing. The symptoms were polyuria, coma, staggering gait, fever, accelerated respiration and muscular tremor. Chemical analysis of the blood revealed a lowered calcium level and a raise of the magnesium content of the blood. The recovery was accomplished by the intravenous injection of 12.5gm calcium chloride and 3gm magnesium chloride in 100cc of distilled water.

TREATMENT OF OTITIS EXTERNA

A detailed examination of the ear, a thorough cleansing of the affected parts and the selection of proper drugs are the essentials for quick and uneventful curative results in the treatment of inflammation of the outer ear duct of the dog.[95] The examination is best conducted with a flash light. The ear is cleansed. Excellent results were obtained with "Kelticon," an odorless liquid consisting of glycerine, fats, and an iodine-compound.

[93] Klarenbeck, A., 1935. Leptospirosis in Dogs During 1934 (Trans. title). *Tijdschr. v. Diergeneesk.*, 62:2, pp. 1183-85.

[94] Gier, C. J., de, 1935. Transit Tetany (Trans. title). *Tijdschr. v. Diergeneesk.*, 62:2, pp. 1186-97.

[95] Schuster, L., 1936. Zur Behandlung der Otitis externa beim Hunde, (Treatment of Otitis Externa in dogs). *Tierärztl. Rundsch.*, 42:9, pp. 169-71.

DISEASE OF CENTRAL NERVOUS SYSTEM IN SWINE

The autopsy of pigs which had exhibited nervous symptoms disclosed extreme pathological changes in the central nervous system. The histological examination revealed meningo-encephalitis, meningitis and hyperemia of the brain. The cause of the disease was found to be a filterable virus which could be transmitted to rabbits. The course of the disease is about two days. The termination is almost always fatal.[96]

RESISTANCE TO ANTHRAX

A breeder fed raw horse and cattle flesh, obtained from a carrion pit, to his 52 silver foxes, 10 raccoons and one dog.[97] The following day, symptoms of disease were observed among the raccoons; they all died subsequently. Autopsy revealed enlargement of the spleen. By cultural methods, by the Ascoli test and by animal experimentation, anthrax was found to have been the cause of deaths. The silver foxes and the dog did not become sick.

DIAGNOSIS OF EQUINE ENCEPHALOMYELITIS

In regions where equine encephalomyelitis was enzootic, Kapitanski[98] and his associates made examination of the bilirubin content of the blood on a large number of horses. They concluded that in the majority of cases the bilirubin test is positive only from one to two days before symptoms appear. In a very few cases was it possible to diagnose encephalomyelitis from five to ten days before the outbreak of the disease, on the basis of the bilirubin test. The authors advise that attention should be paid principally to the appearance of clinical symptoms which will enable the practitioner to recognize the disease quickly in the incubation stage.

[96] Alsman, B., 1935. Pig Epizootic with Symptoms in the Central Nervous System, (Trans. title). *Ssowjetskaja vet.*, 4, pp. 39-42.

[97] Harms, F., 1935. Milzbrand bei Waschbären, (Anthrax in Raccoons). *Deutsche Tierärztl. Wchnschr.*, 43:33, pp. 694-95.

[98] Kapitanski, M., N. Kapustin and E. Pissarer, 1935. Methods of Diagnosing Encephalomyelitis in Horses, (Trans. title). *Ssowjetskaja vet.*, 5, pp. 29-32.

VACCINATION AGAINST EQUINE ENCEPHALOMYELITIS

For the purpose of finding a satisfactory method of vaccination against equine encephalomyelitis, Noskow[99] experimented with rabbits by inoculating them with virus from spontaneous outbreaks in horses. Simultaneous vaccination gave the best results (85.7% protection). Thrice vaccination with formol-vaccine number one gave 83% immune animals. Twice vaccination with living virus (a subcutaneous injection of a virulent brain emulsion) produced immunity in 64.5%. The phenol-glycerin vaccine and the formol-vaccine of Shahan and Giltner gave 50% immune animals. Sensitized virus was entirely ineffectual. The action of phenolized vaccine without glycerine was very weak, only 13% of the animals became immune. Repeated vaccination of rabbits with an anti-rabic emulsion produced a pronounced immunity in them, which, however, was not specific for encephalomyelitis of horses.

URINARY CALCULI IN DOGS

During the past ten years,[101] calculi in the urinary tract had been diagnosed in 58 dogs at the Utrecht Clinic for small animals. Among them were 42 male dogs. In 37 of the latter, the calculi were removed through ureterotomy. The termination of 14 of these cases was fatal. In 13 cases the calculus had to be removed by cystotomy. It seemed strange that 17% of all the dogs were Pekingese. The chemical analysis of the calculi revealed triple phosphate and calcium phosphate in 28 calculi, calcium oxalate and calcium phosphate in eight calculi, cystin in two calculi and uric acid in one calculus. Calculi consisting of cystin are considered to be very rare. The authors conclude that the causes which lead to urolithiasis in dogs must differ from those causing urolithiasis in man. The urolithiasis exciting factor in these dogs is evidently the vegetarian diet, and not the carnivorous diet.

TREATMENT OF EQUINE ENCEPHALOMYELITIS

Urotropin treatment of horses with encephalomyelitis did not bring satisfactory results.[100] Better results were obtained when the urotropin treatment was combined with the injection of serum from convalescing animals. Urotropin is given intravenously in a dose of 15gm in saline solution. Two to three hours later, 250cc to 300cc serum is injected intravenously. A therapeutic effect will be noticed in 24 hours. The recovery is speeded up by the application of symptomatic treatment (cardiacs and laxatives).

TREATMENT OF ENCEPHALOMYELITIS

Urotropin treatment[102] of horses with encephalomyelitis did not give satisfactory results. Better results were obtained when the urotropin treatment was combined with the injection of serum from convalescing animals. Urotropin is given intravenously in a dose of 15 grams, dissolved in saline solution. Two to three hours later, 250 to 300cc of serum is injected intravenously. A therapeutic effect will be noticed in 24 hours. The recovery is speeded up when symptomatic treatment with cardiacs and laxatives is employed.

INFECTIOUS MYOSITIS IN CALVES

In the springtime an outbreak of disease was observed among six- to ten-week-old calves.[104] The disease is characterized by stiffness and trembling when the animal is standing. No symptoms are observed when the animal lies down. The temperature may

[99] Noskow, A., 1935. Vaccination Trials Against Encephalomyelitis of Horses, (Trans. title). *Ssowjetskaja vet.*, 7. pp. 28-34.

[101] Klarenbeck, A., T. Langner, and J. Raabe, 1935. Urinary Calculi in Dogs (Trans. title). *Tijdschr. v. Diergeneesk.*, 62:22, pp. 1179-80.

[100] Petrow, W., 1935. Experiments in Combating Epizootic Encephalomyelitis of Horses with Urotropin and Serum Therapy, (Trans. title). *Ssowjetskaja vet.*, 7, pp. 25-28.

[102] Petrow, W. 1935. Experiments in Combating Equine Encephalomyelitis with Urotropin Combined with Serum Therapy, (Trans. title). *Ssowjetskaja vet.*, 7, pp. 25-28.

[104] Saxer, E., 1935. Über infektiöse Muskelerkrankungen beim Rind; (Infectious Inflammation of the Muscles in Calves). *Schweiz. Arch. Tierheilk.*, 77:4, pp. 174-83.

go up as high as 41° C. As the disease progresses, the animal is unable to rise. Often, pneumonia sets in. Death takes place, usually in eight to 14 days. Distinctly painful swellings of the muscles of the back and hematuria are rarely observed. The viscera show hardly any lesions. The muscles, however, exhibit distinct changes. Bacterial examination reveals diplococci which are considered to be the cause of the disease. Potassium iodide and autogenous vaccine are recommended for treatment.

* * * *

MICHIGAN FLY SPRAY

The following formula of a fly-repellant cattle spray is reported to be satisfactory:

Oleum Spirits, or mineral spirits, 1 gallon.

Pyrethrum (ground flowers), ½ pound.

This spray is made by soaking the pyrethrum in the spirits for 48 hours, with an occasional shaking of the container during this time. The sediment, after settling is removed from the clear liquid and discarded. It is of no further value and may clog the sprayer if left. It kills flies and protects the animal as long as most sprays. There is no injury to hair or skin. The approximate cost of one gallon of spray is about 50 cents.—Mich. Agric. Exp. Sta. Quart. Bul. 16(4) :243.

Book Review

Manual of the Silver Fox and Fur Farming Industries. 132 pages, sixth edition. National Fox and Fur Breeders Association, Wausau, Wis. 25c, postpaid.

This neatly printed, inexpensive brochure of 132 pages, interspersed with advertising, should appeal to the recent graduate, whose expanding practice will bring him in contact with the breeders of fur bearing animals in his territory sooner or later. In this connection, attention is called to the significant advice given on page 53 to the fox rancher: "It is strongly recommended that every rancher establish contact with one or more veterinarians in his locality as early in the development of his ranch as possible. Much time will be lost in attempting to locate a competent veterinarian at the last moment, and he will be better informed on fox diseases if he has been told in advance that he may be called upon to treat foxes." The booklet contains much valuable information of interest to the veterinarian who aims to have a broad knowledge of everything that pertains to his profession, and who wishes to be able to "talk silver fox" or any other fur bearer intelligently to the owner.

Among the 45 contributors to the pamphlet, may be mentioned: F. G. Ashbrook, Bureau of Biological Survey; Dr. C. W. Gay, Ohio State University; Dr. R. G. Green, University of Minnesota; the late Dr. K. B. Hanson, Bureau of Biological Survey; Dr. L. J. O'Reilley; Dr. S. F. Wadsworth; Dr. G. V. Webster, and Dr. W. A. Young.

The brochure is subdivided into three books and one appendix. Book I, "The Silver Fox," contains eleven chapters: History of fur farming; the silver fox; the ranch; food and feeding; principles of breeding; ranch hygiene; parasites; American National Fox and Fur Breeders Association; Markets; preparing the pelt for market; and annual fox and fur breeders exhibits. Book II deals with the blue fox, raising, feeding, breeding, parasites, diseases and sanitation. Book III describes the other fur bearers in five sections. They are mink, muskrat, raccoon, karakul sheep, marten, skunk, beaver and badger. The appendix supplies information on the following topics: Shipping silver foxes; legal aspects; progress; fur bearing animals compared as to productivity and primeness; typical ranch record form; whelping table for silver foxes; gestation periods compared; points of excellence in a fox; officers and board of directors; affiliated associations and officers; parts of the body of a fox; a fur dictionary, and index to advertisers.

Of course, this well-written manual, with its many timely hints, may also be perused with advantage by the experienced diagnostician of diseases of fur bearing animals, who must have authoritative information in a readily accessible form at his finger tips.

MISSISSIPPI VALLEY CLINIC

Veterinarians from Illinois, Iowa, Wisconsin, Indiana, Missouri and Nebraska make up the 244 who attended the all-day clinic of the Mississippi Valley Veterinary Association at Peoria, Ill., June 4, 1936. In number and variety of subjects and in attendance this central Illinois veterinary clinic is running the eastern Iowa clinic at Mechanicsville a close second with prospects of exceeding it in another year.

PACKER'S UNIQUE BILLBOARD

Thomas E. Wilson, chairman of the board, Wilson & Co., unveiled one of the most novel outdoor displays ever conceived at No. Michigan Ave. and Delaware Pl., Chicago, on the evening of June 10. This unique "spectacular" is a billboard into which has been built air-conditioned, plate-glass kennels in which will be exhibited pedigreed dogs from leading Middle Western breeders, all fed on Wilson's "Ideal" dog food. This dog show will run throughout the summer, with breeds being changed each week.—*Nat'l Provisioner.*

MECHANICSVILLE VETERINARY CLINIC

Two hundred sixty-seven veterinarians representing eight corn-belt states, attended the sixth annual clinic of the Eastern Iowa Veterinary Association, June 17th, at Mechanicsville. The registration roll showed 41 veterinarians from Illinois, 17 from Wisconsin, three from Minnesota, 14 from Nebraska, one from South Dakota, one from Ohio and 190 from Iowa. The clinic was staged in the hospital and yards of Dr. F. M. Wilson.

More than 100 poultry subjects were presented and about 50 cases were operated on in the clinic; 8 sheep; 30 horses; 25 hogs; numerous cattle, and some dogs. The operation of deodorizing a skunk was also performed.

ARMY VETERINARY SERVICE

Lt. Colonel Christian W. Greenlee is assigned to Fort Jay, N. Y., for duty effective upon completion of his present tour of foreign service in the Panama Canal Department.

Captain John L. Owens is relieved from further assignment and duty as instructor, Quartermaster Corps Subsistence School, Chicago, Ill., effective on or about July 1, 1936, is then assigned to station at Randolph Field, Texas; and will proceed to Kansas City, Mo., and report to the officer in charge Remount Purchasing & Breeding Headquarters for temporary duty for a period of approximately five months for the purpose of examining remounts for purchase in the Central Remount Purchasing and Breeding Zone; upon completion of this duty to proceed to Randolph Field for duty.

So much of special orders as assigns Major Raymond I. Lovell to duty at Vancouver Barracks, Wash., is amended so as to assign him to duty at the Presidio of Monterey, Calif., upon completion of his present tour of foreign service in the Panama Canal Department.

Captain Arvo T. Thompson is relieved from further assignment and duty at Letterman General Hospital, San Francisco, Calif., is assigned to the Army Medical Center, Washington, D. C., and will sail on the transport scheduled to leave San Francisco on or about August 22, 1936, for New York, N. Y.; upon arrival in New York City will proceed to Washington, D. C., and report to the commanding general, Army Medical Center, for duty.

Major Gerald W. Fitz Gerald is relieved from duty at Presidio of Monterey, Calif., effective in time to proceed to San Francisco, Calif., and sail on the transport scheduled to leave that port on or about November 24, 1936, for the Hawaiian Department. Upon arrival will report to the commanding general for assignment to duty with the Veterinary Corps.

Major Harry J. Juzek is assigned to duty at Vancouver Barracks, Wash., effective upon completion of his present tour of foreign service in the Hawaiian Department.

The appointment of First Lieutenant Donald Clifford Kelley, Veterinary Corps Reserve, as first lieutenant in the Veterinary Corps, Regular Army, with rank from June 23, 1936, is announced. He will report to the commanding officer, Fort Snelling, Minn., for assignment to duty.

Major Daniel H. Mallan is relieved from his present assignment and duty at Carlisle Barracks, Pa., effective in time for him to proceed to New York, N. Y., and sail on the transport scheduled to leave that port on or about September 16, 1936, for the Panama Canal Department, and upon arrival will report to the commanding general for assignment to duty with the Veterinary Corps.

First Lieut. Walter T. Carll is directed to proceed to Camp Perry, Ohio, and report on August 2, 1936, to the Executive Officer, National Matches, for temporary duty in connection with the Matches, upon completion to return to his proper station Brooklyn, N. Y. Lt. Carll will be camp veterinarian for inspection of meat, meat food and dairy products purchased during the encampment.

Major Seth C. Dildine is relieved from assignment and duty at the New York port of embarkation, Brooklyn, N. Y., effective at such time as will enable him to comply with this order. He will sail on or about January 8, 1937, via Government transportation, from New York, N. Y., to the Philippine Department and upon arrival will report to the commanding general for assignment to duty with the Veterinary Corps in China and will proceed to join that station via Government transportation.

Captain Harvie R. Ellis has been directed to proceed, at the proper time, from Fort Riley, Kans., to Governors Island, N. Y., and report to

DOG FOOD THAT YOU KNOW IS SAFE

• Safety in dog food needs to be stressed now as never before. There is no lack of claims about analysis, but pompous words of chemical analysis are no guarantee of purity or nourishment in canned dog food.

YOU ARE SAFE in recommending a canned dog food that is made with FRESH LEAN MEAT and other wholesome ingredients—that is biologically proved through *generation after generation* to *adequately nourish* the animal body—and that is U. S. Inspected and Passed by the Department of Agriculture.

Ken-L-Ration meets all of these requirements. It is the SAFE food for the dog and the ice box at home.

Write for two illustrated booklets giving new facts about dog food.

CHAPPEL BROS. INC.
503 Peoples Ave.
Rockford, Ill.

A Friendly Place to Live
HOTEL
CHALMETTE
You really enjoy the true spirit of New Orleans when you stop at Hotel Chalmette, just a few blocks from historic Canal Street and within easy reach of all points of interest... Large comfortable rooms - low rates.
DAILY $ .50
WITH BATH... SINGLE
DOUBLE WITH BATH $2.50
NEW ORLEANS

the commanding general, Second Corps Area, on temporary duty until on or about June 10, 1936, thence via commercial liner, to Europe, on temporary duty in connection with the 1936 Olympic Games at Berlin, Germany, proceeding upon arrival in Europe to Lucerne, Switzerland, on temporary duty for the purpose of training, conditioning and acclimating horses at that place from June 20, 1936 to July 13, 1936, and upon completion proceed to Berlin, Germany, on temporary duty for the purpose of competing in the 1936 Olympic Games, and upon completion return, via commercial liner to New York, N. Y., thence to proper station. Captain Ellis is the official veterinarian for the U. S. Olympic Equestrian Team.

The following-named officers of the Veterinary Corps who have just completed the course of instruction at the Medical Field Service School, Carlisle, Pa., and are now under orders to proceed to the Army Medical Center, Washington, D. C., for the purpose of pursuing a course of instruction at the Army Veterinary School, are assigned to temporary duty at the stations opposite their names, until such time as will enable them to comply with existing War Department orders.

First Lt. Andrew J. Sirilo, West Point, N. Y.
First Lt. John H. Rust, Fort Myer, Va.
First Lt. Bernard F. Trum, Fort Hoyle, Md.

The following officers of the Veterinary Corps are directed to proceed to Chicago, Ill., and report to the commanding general, Sixth Corps Area, not later than August 4, 1936, for temporary duty during the period of the Second Army Maneuvers, August 8-22, 1936; upon completion of such duty to return to their proper stations:

Monovalent

ENCEPHALOMYELITIS SERUM AND VACCINE

From

NORDEN

Serum, Western type. NRW. 250cc	$6.00
Serum, Eastern type. NRE. 250cc	6.00
Vaccine, Western. NQW. 2-25cc	2.50
Vaccine, Eastern. NQE. 2-25cc	2.50

Sales to Graduate Veterinarians Only

●

Quick Service From

OHIO
Columbus

WISCONSIN
Milwaukee

IOWA
Davenport
Des Moines
Sioux City

MINNESOTA
New Ulm

TEXAS
Ft. Worth

NEBRASKA
Grand Island
Norfolk
Superior

KANSAS
Wichita

INDIANA
Indianapolis

ILLINOIS
Bloomington

CANADA
Oshawa, Ont.

NORDEN LABORATORIES
LINCOLN NEBRASKA

MOBILIZING the DEFENSIVE FORCES

in the treatment of

DISTEMPER . . . COLDS . . . ABSCESSES . . . . ARTHRITIS DISEASES of the EYE, EAR, NOSE and THROAT

•

IN VARIOUS infections the general defensive forces of the body are markedly stimulated by the intramuscular injection of nonspecific proteins reinforced by lipoids.

A combination of these immunizing agents is represented in

OMNADIN

Reg. U. S. Pat. Off. & Canada

Brand of PROLIPIN

Shockless Lipo-Protein Therapy

Supplied in 2 cc. ampules, boxes of 5, 25 and 100. Informative literature and prices on request.

WINTHROP CHEMICAL COMPANY, INC.

170 VARICK ST., NEW YORK, N. Y.

Factories: Rensselaer, N. Y.—Windsor, Ont.

Successor to H. A. METZ LABORATORIES, INC.

Major Fred W. Shinn, Ft. Francis E. Warren, Wyo.

Major Seth C. Dildine, Surgeon General's Office, Washington, D. C.

Major Harry L. Watson, Fort Sill, Okla.

First Lieut. Velmer W. McGinnis, Army Medical Center, Washington, D. C.

The above officers are to be assigned to railheads for the purpose of inspection of meat, meat food and dairy products, fresh fruits, and fresh vegetables delivered to these railheads for distribution to the organizations participating in this field Army maneuvers.

Veterinary Reserve Corps

New Acceptances—First Lieutenants:

Alkire, Robert L., Webster City, Iowa.
Anderson, Wayne A., Fort Collins, Colo.
Arrow, Daniel P., Seattle, Wash.
Baum, Harvey, East Sparta, Ohio.
Benton, Carl R., Everett, Mass.
Berliner, Meyer, Great Neck, N. Y.
Bills, William E., Columbus, Ohio.
Bradley, Donald H., Columbus, Ohio.
Broadwell, John M., Glenwood Springs, Colo.
Brown, Robert F., Bangor, N. Y.
Brown, Robert J., Akron, Iowa.
Bundalian, Martin F., Manila, P. I.
Burch, George E., Granville, N. Y.
Cairy, Clyde F., Sioux City, Iowa.
Cardona, Carlos J., Fort Worth, Texas.

CROCKETT HOTEL

Comfortable rooms with sleep inspiring beds, private bath, ceiling fans, and circulating hot water. Splendid food in the Crockett Coffee Shop—moderately priced.

LARGE SPACIOUS ROOMS WITH BATH

FROM $1.50 A DAY

SAN ANTONIO

TEXAS

THE VETERINARY RECORD

Founded 1888

A WEEKLY JOURNAL
FOR THE PROFESSION.

Published by the

NATIONAL VETERINARY MEDICAL ASSOCIATION

of Great Britain *and* Ireland

2 Verulam Bldgs., Grays Inn
LONDON W. C. 1.
ENGLAND

Subscription, £2.12.0 per annum.

Cox, Charles E., Auburn, Ala.
Cox, Marion T., Kenton, Ohio.
Crawford, James P., Lansing, Mich.
Cromley, Curtis W., Ashville, Ohio.
Cook, Roger A., Pittsburgh, Pa.
Coop, Moray C., San Antonio, Texas.
Cooperrider, Donald E., Columbus, Ohio.
Cope, Russell P., Manhattan, Kans.
Courter, Robert D., Amelia, Va.
Cowen, Russell L., Salida, Colo.
Christopher, Burton C., Olympia, Wash.
Claus, Norman G., Detroit, Mich.
Cole, Elvin G., Kamas, Utah.
Coleman, Charles L., Glendale, Calif.
Collins, Floyd M., Tilden, Nebr.
Cook, Robert W., Manhattan, Kans.
Curtin, Charles J., Livonia, N. Y.
Dehner, Loris A., Concordia, Kans.
DeLand, Charles W., Temperance, Mich.
Dermody, John M., Casey, Iowa.
Dixon, Albert V., Quitman, Ga.
Dodge, Roger E., Beverly, Mass.
Dougherty, Robert W., Newcomerstown, Ohio.
Dye, Harland F., Bridgewater, N. Y.
Eippert, Paul E., Columbus, Ohio.
Elliott, Berton J., Albany, Ohio.
Elsasser, David S., Cleveland, Ohio.
Emminger, Albert C., Turlock, Calif.
Exley, Eldred W., Clyo, Ga.
Frazer, Lloyd A., Oskaloosa, Iowa.

We'll be looking for you—

at the American Veterinary Medical Assn. Convention in Columbus

Come and see us at the Ideal Dog Food Display in Room 2 of the Deshler-Wallick Hotel, August 10th to 14th

Ideal DOG FOOD WILSON & CO **Ideal DOG FOOD**

U. S. Yards, Chicago

Hotel Cecil

Where a Warm Welcome and
GOOD SOLID COMFORT
are always waiting for you

■

700 ROOMS

$1.00 to $2.00 single
$1.50 to $3.00 double

COFFEE SHOP FEATURES
WONDERFUL FOOD

■

Los Angeles

PARK YOUR CAR AT
HOTEL REAR ENTRANCE
SEVENTH & MAIN STREETS

HARLTON'S
LIQUID BLISTER
and
FREE BOOKLET

Easy to apply. Saturate on with hand—no rubbing. Doesn't burn, set skin "on fire," kill hair, or scar. Head let down in few hours. No rest necessary in many cases. Vary application to produce just degree of counter-irritation needed. Diluted with oil, makes any strength liniment desired. FREE SAMPLE—a $1.00 bottle sent free postpaid upon request if you have never had one . . . . treats several cases. It doesn't pay to be without this convenient, effective and economical preparation; write for sample or mail order today. 4-oz. size, $1.00; 16-oz., $3.00.

Detroit Veterinary Supply Co.
460 West Jefferson Avenue, Detroit, Michigan
Canadian Branch, 139 Sandwich St., Windsor, Ontario

Frick, Keith R., Mio, Mich.
Gale, Mark E., Concordia, Kans.
Geyer, Harry G., Grove City, Ohio.
Glover, Albert D., Newark, Mo.
Gouge, Robert E., Sedalia, Mo.
Guard, William P., Friday Harbor, Wash.
Hackett, Clarence P., Kingman, Ohio.
Harden, Chester N., Brockton, Mass.
Henkel, Ernest L., New Bridge, Ore.
Herman, Leslie F., Cleveland, Ohio.
Hester, Kenneth J., Eaton, Colo.
Hillstrom, Werner F., Laurium, Mich.
Hinkle, Thomas C., Jr., Carbondale, Kans.
Houk, William S., Muscatine, Iowa.

"Dejem"

CANINE DISTEMPER COMPOUND

"Dejem" is decidedly beneficial to dogs with DISTEMPER. It also controls the severe sickness following inoculations.

"Dejem" 16 oz. size, 1 bot.....$ 2.75
3 bot. .....$6.75, 6 bot.....$12.00

Mangan & Co., Laboratories
294-298 E. 161st St. New York

FISTONE

In such cases as Fistulous Withers, Catarrhal Metritis and Chronic suppurative affections due to internal focal infections, nothing has proven so successful as Fistone.

Used by leading veterinarians the world over for more than a quarter of a century.

• • •

THE FISTONE AND APPLIANCE COMPANY
College Corner, Ohio

Trial Order—One dozen boxes (once only).....$ 8.00
Regular Price one dozen boxes..... 10.00
One-half dozen boxes..... 5.00

Dr.....

Address.....

for

HEMORRHAGIC SEPTICEMIA

•

VACCINE • AGGRESSIN • SERUM

Lederle

LIKE A THIEF IN THE NIGHT, Hemorrhagic Septicemia may creep in wherever live stock are assembled and take its toll—sometimes single handed, sometimes in combination with other disease-producing organisms.

for immunization of all species of live stock the best insurance is protection with HEMORRHAGIC SEPTICEMIA (WHOLE CULTURE) VACCINE ***Lederle*** . . . or

HEMORRHAGIC SEPTICEMIA AGGRESSIN ***Lederle.***

for treatment—Use immediately large doses of ANTI-HEMORRHAGIC SEPTICEMIA SERUM ***Lederle,*** produced from both horses and cattle.

The Anti-Hemorrhagic Septicemia Serum is a valuable preventive where immediate protection is desired prior to shipping. For permanent immunization the serum should be followed by vaccine or aggressin within seven to ten days.

When ordering serum, specify whether from a bovine or equine source

LEDERLE LABORATORIES, INC.

30 ROCKEFELLER PLAZA NEW YORK, N. Y.

Hults, Charles E., Ithaca, N. Y.
Jacobs, Marvin H., Ames, Iowa.
Jensen, Christian G., Lansing, Mich.
Jones, Kenneth S., Rushysylvania, Ohio.
Jones, Leslie W., Littleton, Colo.
Joneschild, William R., Tacoma, Wash.
Josse, Charles K., Piqua, Ohio.
Kinchelow, William D., Denver, Colo.
Koutz, Fleetwood R., Baltimore, Md.
Landers, Leo, Boston, Mass.
Larsen, Burt W., Cassville, N. Y.
Lassen, Keith O., Phoenix, Ariz.
Legner, Armand A., Leland, Ill.
Leonard, Harry A., Holly, Colo.
Lindenstruth, Henry J., Marshfield, Mo.
McCutchan, Howard E., Plymouth, Ill.
McNay, Garrett H., Garden Grove, Iowa.
Maxwell, Ralph A., Salem, N. Y.
Metz, Clark A., Clarence Center, N. Y.
Milici, Rosario F., Brooklyn, N. Y.
Millenbruck, Edgar W., Marysville, Kans.
Mills, John W., New Paris, Ohio.
Mirin, Solomon, Brooklyn, N. Y.
Mood, Bernard F., Savannah, Ga.
Moore, Morris E., Arcadia, Ind.
Moser, Herman L., Dalton, Ohio.
Murphy, Edward A., Kansas City, Kans.
Myers, Philip, Floresville, Texas.
Nathanson, Sidney, Brooklyn, N. Y.

TONAMINE

For Undernourished Puppies and Convalescent Animals

TONAMINE builds up the strength of convalescent animals and undernourished puppies. Restores the appetite of run-down small animals. Successfully offers Vitamins B, G and D as a supplement to regular diet. Also is rich in food value and good for distemper. Keeps small animals "fit." Tonamine is the ideal reconstructive.

"I'll See You at The Veterinary Convention!"
Frank Vosburgh

R. J. STRASENBURGH CO.
Rochester, N. Y.
Pharmaceutical Chemists Since 1886

SWINE DISEASES

The cooperation of practitioners in supplying specimens has enabled us to accumulate a fund of information relative to the nature and prevention of numerous swine diseases. This information has not only been given direct to the practitioner by letters, but also to the entire profession in discussions at meetings and in published articles.

Present indications are that various swine diseases may be quite prevalent within the next few weeks.

Enteric and Pulmonary disorders may occur in swine that have not been vaccinated with anti-hog cholera serum, in cholera immune swine, and as complications of cholera.

Best results from cholera vaccination are obtained only when healthy herds are treated. Swine sick of disease other than cholera should be properly treated prior to the use of serum and virus.

Kinsley's Mixed Bacterin Swine will be found par-excellent in controlling suipestifer and para-typhoid enteritis, pulmonary oedema and hemorrhagic septicemia.

The method of procedure will depend upon the prevailing conditions. Swine affected with bacterial pulmonary or enteric disorders that are immune to cholera or unvaccinated should be given Mixed Bacterin Swine (Kinsley). Swine affected with cholera complicated with bacterial, pulmonary or enteric disorders should be given Mixed Bacterin Swine (Kinsley) in addition to the usual cholera immunization.

We will be glad to help you solve your swine problems. Write, Phone or Wire

KINSLEY LABORATORIES

Phone: Logan 4600

1103 EAST 47TH ST. KANSAS CITY, MISSOURI